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JANUARY 1957

Industry Power

For Men Who Manage

Power Services

A Putnam Publication | Executive Magazines for Industry

INDUSTRY LEADERS LOOK AT 1957

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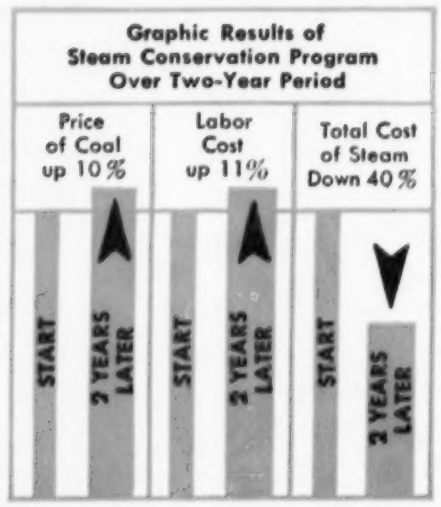
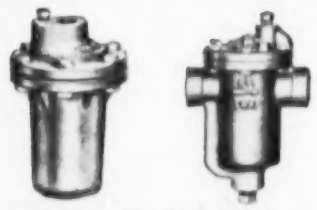
Coal for Power	PICKETT
Electric Utility Supply	VENNARD

How a Major Chemical Company Cut Steam Costs $100,000 Annually





Trap sizes and styles
for every condensate drainage job.

Armstrong Traps were a "Major Factor" in Steam Conservation Says Chief Engineer

Steam waste has a way of creeping up on you. Especially in older plants. The losses can make a staggering total.

Plants looking for a way to fight rising costs can well take a page from the 8-point steam conservation program that netted a major chemical plant $100,000 annual saving:

1. **Waste steam utilized** — all flash steam recovered for building heating.
2. **New steam traps installed** — Armstrong traps replaced old traps throughout the plant, indoors and out.
3. **Steam leaks repaired.**
4. **Insulation repaired.**
5. **All condensate recovered.**
6. **Steam piping simplified.**
7. **Steam turned off when not needed.**
8. **Preventive maintenance improved** to insure a continuous checkup on sources of waste.

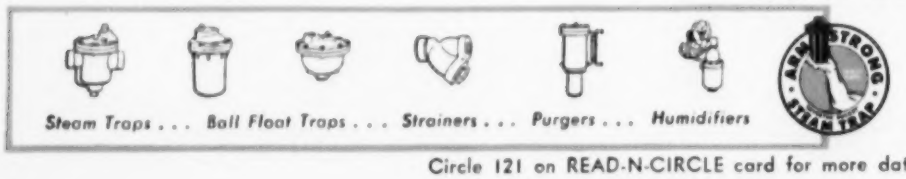
In commenting on the program, the Chief Engineer of the plant stated, *"4000 new Armstrong steam traps were one of the major factors in conserving steam. The traps, plus improved installation practice, have reduced annual trap maintenance parts and labor by $25,000 as compared to traps previously used."*

Want all the facts? Tips on cost-saving standardized trap hookups? Facts about Armstrong traps? Ask for:

1. The No. 1, 1956 issue of the Armstrong Trap Magazine containing complete details, drawings and photos.
2. The 44-page Armstrong Steam Trap Book, a fact-full guide to better trapping.

Call your local Armstrong Representative or write:

ARMSTRONG MACHINE WORKS
8201 Maple St., Three Rivers, Michigan



ARMSTRONG STEAM TRAPS

Circle 121 on READ-N-CIRCLE card for more data

late news

. . . about industry power

• Form BCI to promote coal

Market Promotion Department of the National Coal Association has been so successful that NCA directors have authorized a more ambitious program. Coal promotion will now come under the newly formed Bituminous Coal Institute. BCI, to be the national arm of the coal industry in heating and power plant engineering, will carry out a national program to encourage increased use of bituminous coal and to improve coal's competitive position. Functions of BCI are four-fold: to render engineering assistance to existing and potential coal users, architects, and consulting engineers through field representatives; to develop sound engineering data, designs, recommendations, and general information; to determine exact extent and nature of coal's potential markets by undertaking market research; and to foster public acceptance of coal by advertising and public relations efforts.

• Salute National Electrical Week

Plans for the second annual observance of National Electrical Week, February 10 to 16, are now well underway. National Electrical Week, sponsored by organizations representing all major segments of the electrical industry, is scheduled annually for the week spanning Thomas A. Edison's birthday. Overall objective is to enhance public appreciation of electricity and electrical industry's contributions to our nation's progress and economy.

• Citizens shape water pollution policy

A national citizens group will help shape federal water pollution control policy under a new act passed by Congress. Eight prominent citizens, long interested in water conservation problems, were appointed on Nov. 9 by President Eisenhower to serve as members of the Water Pollution Control Advisory Board of the Public Health Service. A ninth member is yet to be named. Chairman of the Board, as specified by law, will be either the Surgeon General or a sanitary engineer officer designated by him.

• Construction outlook for 1957 booms

Outlays for new construction are expected to total almost $46.5 billion in 1957, about 5% more than 1956. Announced expansion programs suggest unprecedented expenditures in 1957 of about $5.75 billion on privately owned public utilities. Most significant dollar gains among the several kinds of utilities will probably occur in natural gas pipelines and electric power facilities. Private industrial plant construction will continue to expand in 1957, but at a much slower rate than during the past two years. This reflects in part the fulfillment of capacity goals in some industries, and revision of expansion programs in others. $3.2 billion expected to be put in place on industrial buildings in 1957 will be an alltime high, exceeding 1956 volume by 5%.

(more late news on page 8)

INDUSTRY LEADERS LOOK AT 1957

Atomic Power

LEWIS L. STRAUSS, Chairman
U. S. Atomic Energy Commission

WE RECOGNIZE that the atom is endowed with a sovereignty that ignores geographic frontiers. We know, too, that it is neither moral nor immoral, and stands ready to serve man .... or, if man so chooses, to destroy him. It is a giant possessed of incredible strength, yet obedient to man's will. We believe that allwise Providence placed the knowledge of it in our hands for good. That belief is fundamental to our work.

The United States has built and operated more atomic reactors of all types and all sizes, for all purposes, than all the rest of the world combined. We have *built* a total of 82 reactors in this country, and at least 127 more are either already under construction or planned. Of this total of 209 or more reactors — it may be closer to 212 or 214 — more than a third are power-producing types, either experimental or prototype. A substantial number are, of course, military power plants such as those which propel our atomic submarines. These military reactors provide valuable knowledge to aid in developing power plants for civil use.

In terms of strictly *civilian* atomic power, our program includes 30 reactors in operation in the United States, under construction, planned, or proposed for experimental or for actual fullscale use. Eighteen of these 30 plants will provide civilian commercial power for homes and industries, beginning with the Shippingport plant next year. Of these 18, there are 3 involving proposals which the Commission is studying and has not yet acted upon.

This is the important figure to keep in mind — 18 nuclear power plants for operation in the United States between 1957 and 1962 with a total generating capacity of approximately 1,200,000 kw (electrical) — a sufficient capacity for the needs of, say, the States of Rhode Island and New Hampshire. The 18 plants represent an investment of well over $650 million. More than half of that sum will be provided by industry. Of those 18 plants, six will be built by industry without depending on the Government for any direct financial subsidy. ♦ ♦

Steam Generation

WILLIAM F. RYAN, President
American Society of Mechanical Engineers

TODAY'S MOST SIGNIFICANT trend in electric power development is the rapidly increasing capacity of individual generating units. Steam pressure increases reached the area of diminishing returns some time ago. We now have plants under construction to operate at pressures as high as 5000 psi. Any broad trend in that direction, however, awaits developments permitting much higher temperatures than are now feasible. That, in turn, awaits a radically new metallurgy — production of the so-called "synthetic metals." On the research horizon we may visualize steam temperatures approaching 2000 F and pressures of 10,000 psi or higher. In the meantime, our trend flattens out on a plateau — not much over 2400 psi and 1100 F at our turbine throttles.

Trend toward giant machines does not await radically new scientific developments. Our turbine designers' skill is so great and manufacturing facilities so highly developed that definite limits cannot be fixed on machine sizes that can be produced in the foreseeable future. Many utilities that were installing 25,000- to 30,000-kw units before World War II are now installing 100,000- to 150,000-kw units. Those systems that were installing 150,000-kw generators are now crowding manufacturers for larger and larger machines. Machines of 200,000 kw are almost commonplace, and the largest now on order — 450,000 kw — will undoubtedly be exceeded.

Design of steam generators, condensers, feed pumps, and fuel-handling facilities for such leviathans is a challenge to our mechanical engineers. Operation of such units requires a high degree of automation. Huge machines are also accelerating other mechanical developments such as main-turbine-shaft-driven boiler feed pumps.

In searching for low cost power, past trends have aimed toward greater reliability and higher efficiency. As these factors approach the asymptote of perfection, further cost reduction rests on higher output per man-hour and per unit of capacity. Achievement of these goals is today's task for mechanical engineers in the power generation field. ♦ ♦

Electricity, Education

MERVIN S. COOVER, President
American Institute of Electrical Engineers

A SINGULARLY IMPORTANT trend is the progress that will be made in design and construction of full-scale commercial nuclear power plants. Concurrently, there is the probability that future applications of electric power will result in producing more goods for more people at lower costs.

Other important trends are apparent even to the casual observer .... whether he be producer or consumer. Few of us stop to realize that our national population continues to grow at a rapid rate. This creates expanding consumer demand. Small towns become larger. Decentralization is the pattern for industrial expansion. More new electric generating plants will be needed, and existing plants will be expanded. Distribution systems, with proper controls to insure service continuity, will become more complex. Industrial and domestic customers will use more electric service. Dependable electric service will be available to all customers regardless of size or classification.

Trends in engineering education seem destined to affect not only the next few years, but will have influences over a longer range. Most serious trend is the combination of larger numbers of young men entering our engineering curriculums, together with insufficient budgets .... producing salaries lower than currently available to educators elsewhere. Low salaries do not always hold qualified engineering reachers, nor do low salaries attract qualified teachers to replace those who resign.

Future problem facing our educational institutions is how to maintain quality instruction with rising enrollment and shrinking teacher personnel. Problem of obtaining an adequate supply of qualified teachers is critical. This problem is not only critical in electrical engineering, but in all engineering education. Added to this is a similar situation which exists in our high schools. This combination results in a national problem that transcends that of our present day shortage of engineers. ♦ ♦

(continues on page 5)

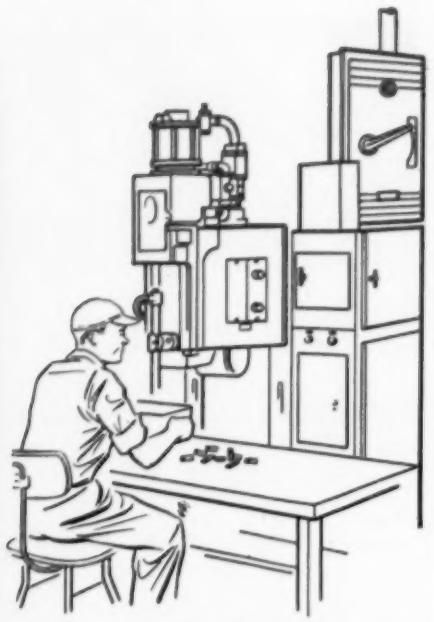
MOLDED CASE CIRCUIT BREAKERS

Magnetic only type ETI circuit breakers are available in F, J, K, KL, L and M frames (3 to 800 amperes continuous ratings), 2 or 3 pole, 600 v a-c, 250 v d-c.

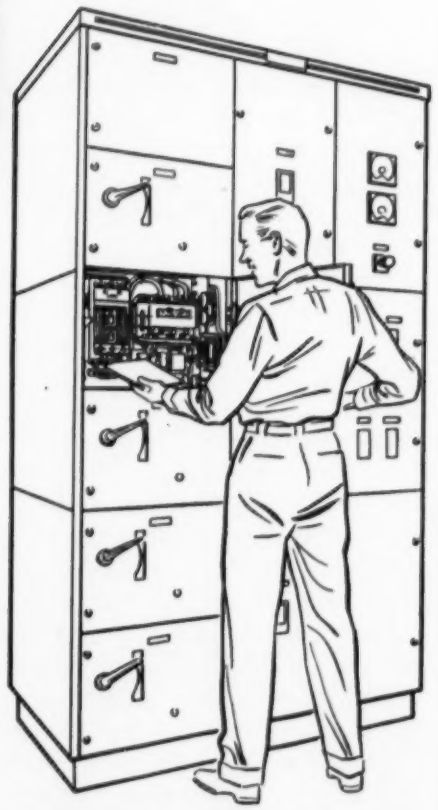
Selective Short Circuit Protection for Motors and Resistance Welders

External instantaneous trip adjustment.

In motor control and resistance welding applications, adjustment of protective devices to a required setting is important. One of the many features of the ETI circuit breaker is its convenient externally adjustable magnetic trip device. When it is required to adjust the trip to a finer degree, adjustment is made from the front of the breaker without interrupting service or encountering live conductors. The range of instantaneous trip adjustment means greater protection for motors and resistance welders. When a short circuit occurs, all poles open simultaneously. And enclosed terminals protect personnel, yet permit easy cable connections. All these extra values in I-T-E Molded Case Circuit Breakers are yours at no extra cost. Send for complete information or contact your nearest I-T-E authorized distributor.



Typical resistance welder application of *magnetic only* type ETI circuit breakers in an individual enclosure.



Typical motor control application of *magnetic only* type ETI circuit breakers.

Molded Case Circuit Breakers...added value at no extra cost

I-T-E CIRCUIT BREAKER COMPANY Small Air Circuit Breaker Division

19th & Hamilton Sts., Philadelphia 30, Pa.

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Industry Power

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INDUSTRY LEADERS LOOK AT 1957

Air-Conditioning

JOHN W. JAMES, President
American Society of Heating and Air-Conditioning Engineers

SIGNS OF THE TIMES indicate that for the eighth consecutive time, the coming year will break all previous records for total sales volume in the entire heating, ventilating, and air-conditioning industry .... 1957 sales to reach nearly $3.4 billion.

Expanding air-conditioning into the nation's industrial plants is considered as a great sales potential in the immediate future. Estimates show that industrial plants comprise about 12 billion sq ft of floor space, with less than 10% of such space now fully air-conditioned.

Industrial plant heating and air-conditioning was, at one time, primarily considered for product quality control. Now, administrators are considering benefits derived from increasing employee comfort and efficiency. Installing properly controlled year-round air-conditioning not only brings greater worker comfort but also brings a sharp reduction in fatigue .... along with reducing job accident rates, absenteeism, and employee turnover. Moreover, per sonnel develop better dispositions, are more wide-awake and full of energy when working in properly controlled environment.

In a critical labor market, it is probable that the air-conditioning of factories may be a factor in competition for personnel. ♦ ♦

starting next month ....

A new Power Basic Series .... Engineering Economics

Here, in an unusually casual style of writing, we will present the facts of economics that underlie all sound engineering decisions. This will be a Power Basics Series you will not want to miss .... and will enjoy reading. Watch for Power Basics: Engineering Economics starting

in the February issue

INDUSTRY POWER

Gas Supply

C. S. STACKPOLE, Managing Director
American Gas Association

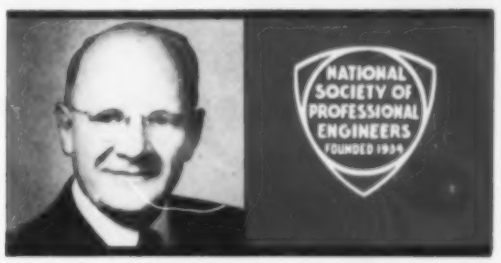
SOME 1.8 MILLION NEW customers will be served by the gas industry during 1957 and 1958, bringing total number of customers to almost 32 million. Sales of gas by 1958 will aggregate 81.3 billion therms, an increase of 12.4% from indicated 1956 totals, while revenues will aggregate $4.45 billion in 1958, a gain of 17.1% from 1956 total of $3.8 billion.

By 1958 total natural gas production will aggregate 12.5 trillion Btu, equivalent to 29% of total energy production in the United States, compared to 10.1 trillion Btu and 26% in 1955. In terms of uses for which natural gas is competitive (excluding motor vehicles, railroads, vessels, etc.) natural gas will supply 53% of the nation's requirements by 1958, compared to 48% in 1955.

Most significant gains will occur in the residential category .... with sales and revenues in this class of service advancing 15.4% and 17.6%, respectively, over the two-year period. At the end of 1955, over 90 million gas appliances were in use. Potential exists for an additional 57 million gas appliances during 1956 through 1959. During 1957 and 1958, 2.6 million additional customers will use gas for heating their homes, bringing the total to 18.6 million residential heating customers by 1958.

To meet increased demands for its service, the gas industry will spend $3.7 billion in 1957 and 1958 for new construction. Of this amount, $1.5 billion will be spent for expanding natural gas transmission facilities, while $1.3 billion will be utilized for increased distribution. Total investment in gas plant and facilities, together with other assets will attain a level of $22 billion by the end of 1958, almost 40% larger than total assets at the end of 1955. ♦ ♦

Is it strange ....
that you should receive a magazine such as INDUSTRY POWER without being subjected to the formality of a token subscription payment? Not at all. For the reasons why ....
see page 52



Professional Status

ROBERT J. RHINEHART, President
National Society of Professional Engineers

IT IS DIFFICULT indeed to condense into a few short paragraphs the many forces now at work, both within and without the engineering profession, that will affect professional status of power engineers in utilities and industrial plants.

History shows that civilization progresses with its ability to harness power. A look at the growth of our power demands since World War II indicates that our expanding economy rides, to a large degree, on our abilities to provide power to drive our machines, our production processes, and our complex distribution systems.

With this growing awareness of our power requirements comes a correlated awareness of our reliance on engineering skills. This alone has considerable bearing on professional status of power services engineers. These requirements, however, increase the professional responsibility of power services engineers. There must be a growing awareness that these responsibilities be met through greater participation in professional societies. There should be increased concern by industry to provide a climate for professional development. These factors will have considerable bearing on the engineering profession's future status. It goes without saying that if the status of all professional engineers rises, the position of engineers in the power field will improve.

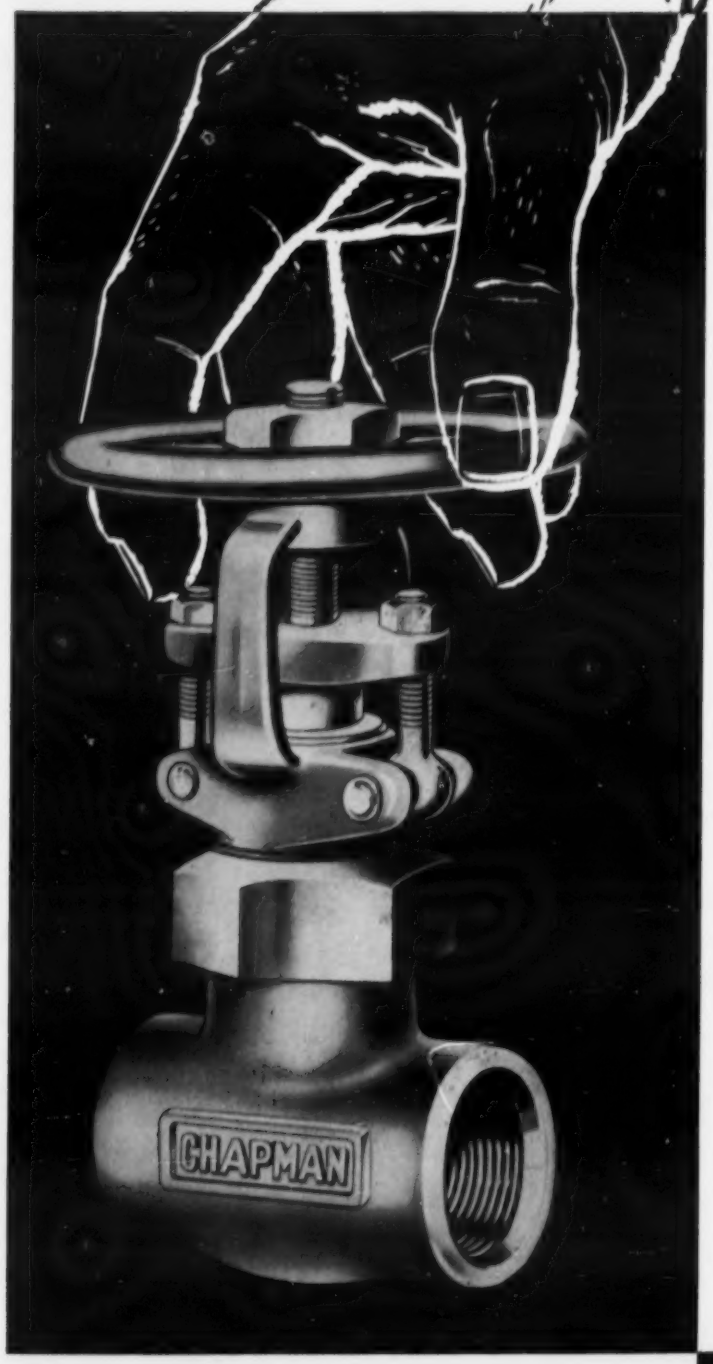
Two big factors are already evident in this increased awareness of professional responsibility:

a) The continued growth and acceptance of registration as a criterion of professional competence. All 48 states now have registration laws.

b) Increasing participation by engineers in their professional society affairs plus activity in civic, fraternal, and charitable organizations. By such activities, not only are engineers justifying recognition as a professional dedicated to mankind's service, but at the same time they are increasing public awareness that our great technological advances are possible because of the dedicated, skilled brainpower represented in the engineering profession. ♦ ♦

(continues on page 12)

TURN ON PERFORMANCE
...Turn off your Costs!



CHAPMAN LIST 960
Forged Steel
Gate Valves

This is an open and shut case of top performance and lowest maintenance. To begin with, the wedge faces on Chapman List 960 are *super* hard. In fact, they're hardened to 800 Brinell by Chapman's *exclusive Malcomizing process.* They can't seize. They can't gall. The seat rings are hardened stainless steel. They last longer and, when necessary, they're very easy to replace.

There are no full-pressure repacking difficulties. Bolted follower on the outside screw rising stem design has no threads that are exposed.

Is it any wonder there are more Chapman List 960 valves on more jobs than any other small forged steel gate valve? They stand up perfectly under conditions ranging from 380 psi at 1000°F to 2000 psi at 100°F. You use Chapman List 990 valves for higher pressures. Sizes for List 960 are from ¼″ to 2″. You can have rising stem with yoke or rising stem with inside screw. And the Bonnet joint is either gasketed or ground metal-to-metal, depending upon your needs.

To take a good look at the ways to cut your valve costs, take a good look at our Catalog 10. Write, today, for your copy.

The CHAPMAN VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASS.

Circle 101 on READ-N-CIRCLE card for more data

nuclear news

. . . about industry power

SEE INCREASED ATOMIC ACTIVITY IN '57

Atomic industrial activity will continue to increase rapidly in 1957 according to Wilbur E. Kelley, president of Walter Kidde Nuclear Laboratories. Among the trends Kelley sees are: (a) Some nuclear reactor projects currently under way will reach the "hardware" stage next year; (b) Reports from Washington indicate that the aftermath of the Gore Bill, debated during the last session of Congress, will lead to further intensification and diversification of the atomic power program; (c) Fission products will be available in increased quantity and at lower cost when Oak Ridge pilot plant begins production early next year; (d) The Federal project for a food irradiation reactor and the increased gamma irradiation facilities now going into operation will provide research results that will trigger more atomic industrial activity. Kelley further cited novel nuclear power plants undergoing feasibility studies on behalf of Baldwin-Lima-Hamilton Corporation and the Denver & Rio Grande Western Railroad.

PROBE NEW REACTOR TYPES

Organic chemicals may prove the means to low-pressure cooling and moderating systems in nuclear reactors, permitting simpler and cheaper installations. Monsanto Chemical Company has announced data showing that certain organics offer economic advantages as noncorrosive, low-pressure coolants. . . . feasibility and economics of heavy-water moderated reactors for power generation will be studied by du Pont for the AEC, with particular attention to natural uranium as a fuel. . . . General Electric is undertaking a program to determine whether enriching natural uranium with plutonium would make a desirable fuel for power reactors. This new fuel might make possible more net power from a given uranium supply.

GET STARTED NOW

The AEC or industrial companies "are not going to seek out a company and then ask them to do work in an area in which they do not have a high degree of competence." This

was told to the AIChE by J. W. Blanton, National Research Metals Corp. Blanton cautioned that management should not look for the "perfect opportunity" in the nuclear field but should be prepared to build a background suited to its technical, managerial, and financial resources if they ever expect to undertake nuclear activity.

SYLVANIA, CORNING, AND MARTIN EXPAND

Sylvania Electric Products and Corning Glass Works are planning a jointly owned company for expanding research development and production activity in atomic energy. The new organization will take over the atomic energy business of both companies, combining Sylvania's background in metallurgy with Corning's background in ceramics. Options on a 150-acre site at Andover, Mass., have been taken for a multi-million-dollar center. . . . the Martin Company has formed "Martin International," a wholly owned subsidiary to explore and develop world markets for nuclear powered electric generating systems. Martin will concentrate on those areas where power-starved nations are ready to bridge the gap from dependence on fossil fuels to nuclear power development. Martin is counting on a background of experience with 10,000-kw to 15,000-kw reactors to kick-off its new venture.

INSURANCE EXECS HEAR NUCLEAR FACTS

Chubb & Son, insurance underwriters, invited Walter Kidde Nuclear Laboratories to present a nuclear energy seminar because "we feel it is essential that our executives and underwriters become as familiar as possible with the increasing application of nuclear energy to industrial activities. . . . it is imperative that insurance underwriters have an understanding of the hazards to the public and to employees, as well as to physical property."

FERGUSON TO BUILD BREEDER REACTOR II

H. K. Ferguson Company, Cleveland, will be architect-engineer for design of the Experimental Breeder Reactor II, part of the AEC's five year program for developing competitive electric power from nuclear energy. The 20,000-kw (electric) sodium-cooled reactor will be built at National Reactor Testing Station under the auspices of Argonne National Laboratory. ♦♦

7 REASONS WHY

Hartzell Vaneaxial Blowers

• LAST LONGER

• DO A BETTER JOB

Belt-drive model (shown) available in sizes from 12" to 54", standard or high-temperature construction. Also available in direct-drive models, 18" to 42". These blowers operate efficiently against pressures as high as 10", deliver up to 87,000 CFM. For complete details, write for Bulletin A-110 or call your nearby Hartzell field engineer.

- Heavier gauge steel throughout — outer shell steel ranges from 14 gauge on 12" models to ¼" plate on 54" models — to evaluate strength of construction, compare net weights before you buy.
- Precision-cast, aluminum alloy impeller, dynamically balanced to prevent vibration.
- All-welded construction — guide vanes are welded to both inner and outer shells — there's nothing to work loose and vibrate.
- Certified ratings—all Hartzell blowers are tested for air deliveries according to the Standard Test Code.
- Easy maintenance—ball bearing pillow blocks are Alemite lubricated from outside the duct section — belts can be changed by removing one small plate.
- Belts totally enclosed to prevent damage by elements in the air stream . . . yet easily adjusted by turning two bolts.
- Top quality motors supplied by nationally recognized manufacturers.

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

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PROPELLER FAN CO.
Div. of Castle Hills Corp.
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ENGINEERING OFFICES IN PRINCIPAL CITIES

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GREENLEE BROS. & CO. CUT FUEL COSTS 17%

B&W boilers with Jet Ignition Stokers assure savings despite increased fuel prices

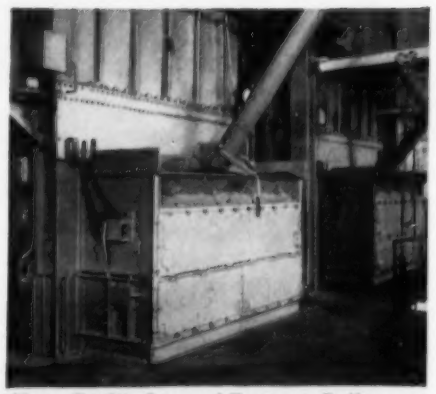
As one of the country's leading machine tool manufacturers, Greenlee Bros. & Co., Rockford, Illinois uses large amounts of steam for all year operation of air compressors and for plant heating. And to maintain profitable overall operation it is important that the steam supply be dependable—and steam generating costs kept to the minimum.

Since the installation of two B&W Integral-Furnace Boilers, Greenlee has enjoyed uninterrupted steam service from a dependable, efficient source. Equipped with modern B&W Jet Ignition Stokers, these units have built a record of operating efficiency while burning a wide variety of Illinois bituminous coal.

At Greenlee, as at other industrial plants using steam, careful consideration of long term costs and proven reliability were important factors in the choice of B&W Integral-Furnace Boiler units.

If your steam production cost is important . . . if you are considering steam plant modernization or expansion for increased dependability and efficiency . . . it will pay you to investigate B&W's more than 90 years of boiler experience. Let us show you what it can do for you.

For further information or assistance write to The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.



Two B&W Integral-Furnace Boilers at Greenlee, equipped with B&W Jet Ignition Stokers, burn a wide variety of Illinois bituminous coal.

HERE'S WHY YOUR STEAM COSTS LESS
With B&W Integral-Furnace Units

- Minimum floor space and headroom requirements
- High fuel economy
- Smokeless combustion
- Adaptable to all fuels and firing methods
- Economical fast steaming
- Water-cooled furnace
- Clean, dry steam at all ratings, even with high boiled water concentration
- Quick response to wide and heavy load swing demands
- Easy to inspect and clean
- High availability with least attention

BABCOCK & WILCOX
BOILER DIVISION

G-827-1B

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late news

. . . starts on page 2

• How Suez affects our oil prices

As expected, the demand for tankers for the longer hauls since the Suez Canal closing, together with considerably higher insurance rates following the outbreak of hostilities, have driven ocean rates higher. This is reflected in higher oil costs, not only in Europe but on our East Coast as well. Neverthless, total fuel oil consumption during September totaled 5,202,126 barrels . . . . an increase of 0.4% over September 1955 consumption and 0.5% above August 1956.

• AGE builds another mammoth

Second of two 450,000-kw electric generating units, largest in the world, will be installed in American Gas and Electric Company system's Philip Sporn plant this year. It should be completed by late 1959. Like its AGE system sister unit, being built by Indiana & Michigan Electric Company on the Wabash River, new unit is expected to show a 5% thermal efficiency improvement over the world's best unit to date . . . . as well as a 7.5% decrease in capital cost per kw of generating capacity. This will be brought about by economies due to larger unit size, higher turbine speed, space reduction, elimination of boilerhouse, and many other factors.

• Engineers' salaries increased last year

Engineers and other professional employees in American industry are earning about 8.6% more than they earned in 1955, according to a survey just distributed by the American Management Association's Executive Compensation Service. This overall average increase compares with an increase of about 4.5% for the previous year. New study's coverage of more than 31,400 engineers, scientists, and administrative employees in 49 different activities at five levels of responsibility makes it the largest and most comprehensive of its kind ever conducted. Engineers with less than one year of experience are earning a median salary of $5300 a year, regardless of area of specialization. Next higher category of engineers, with experience ranging from one to three years, has a median salary of $6500 a year. Highest salaries reported in the survey are being paid to certain nonmanagement specialists in research and exploration with some administrative duties. In a few cases these individuals are earning as much as $19,000 a year. Physicists and mathematicians with similar administrative duties are not far behind, with average salaries up to $15,000 a year. ♦♦

that's interesting

. . . for industry power

Fan runs red hot

Westinghouse Electric Corporation has installed two 9-ft gas recirculating fans to handle gases at 850 F at the Philo, Ohio plant of American Gas and Electric Service Corporation. For use on the first commercial supercritical pressure boiler, fan wheels must be capable of a top speed of 25,000 fpm while handling hot gases. Wheels begin to glow from extreme heat when operating at high temperatures. Wheels will expand ⅝ inch in building up from room temperature to maximum operating conditions. Housings are supported by 8-ft tall pedestals, which permit controlled expansion while maintaining necessary clearances.

Test supersonic ball bearings

Ball bearings spinning at 120,000 rpm—some 120 times faster than the axle of an auto travelling a mile a minute or slightly faster than the speed of sound—are being tested at General Electric Company's new million-dollar Bearing and Lubricant Center.

New water plant desalts 86,400 gpd

World's largest plant to electrically purify salt water is ready to go on stream at Bahrain in the Persian Gulf. Desalting plant was manufactured by Ionics, Incorporated, for the Bahrain Petroleum Company, Ltd. Plant will produce 86,400 gpd fresh water to supply drinking and cooking water needs for a community of about 5000 persons. Plant input water comes from wells drilled on the island within sight of the Persian Gulf, but which contain only 1/14 as much salt as Gulf water. Principal operating cost is the electricity . . . . with occasional replacement of the 4500 thin plastic membranes. Fifteen kwh will make 1000 gallons of fresh water. Process does not remove air from the water and leaves some solids, so resultant water has an excellent, fresh taste.

Solar engines everywhere in 50 years

Solar engines have immediate practical application in the arid areas of the world and may be economically feasible everywhere within the next 50 years, according to Peter Courvoisier, research physicist of the Solar Observatorium at Davos, Switzerland. Solar engines have a low rate of conversion from heat energy to mechanical power, limited by physical laws to 10%. Inasmuch as the fuel is free, however, this rate is not prohibitively low. ♦♦

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VOLUME 72 NO. 1 JANUARY 1957

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- Major articles are indexed on title page. See page 11.
- Advertisers' nearest sales and service offices are indexed alphabetically. See pages 53 and 54.
- Advertisements are indexed by products in handy guide. See page 46.
- Important literature is indexed by products. See page 34.

A PUTMAN PUBLICATION

Industry Power

FOR MEN WHO MANAGE POWER SERVICES

VOLUME 72 NO. 1 JANUARY 1957

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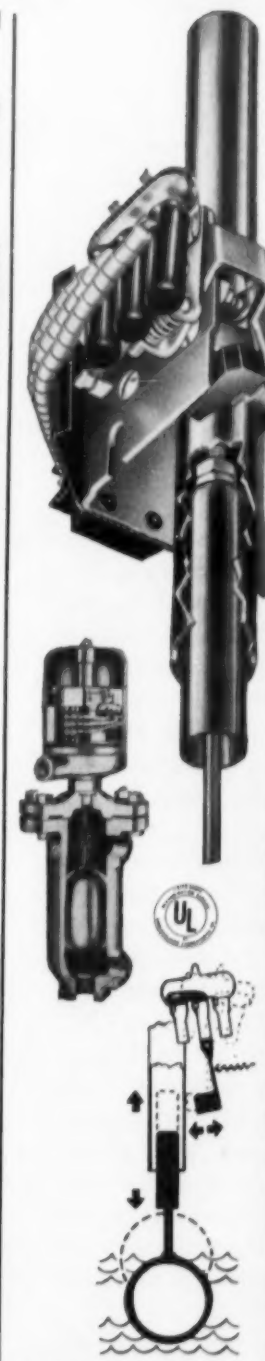
WHY you are SAFER with MAGNETROL BOILER WATER LEVEL CONTROL



A magnetic sleeve, raised and lowered within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

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INDUSTRY LEADERS LOOK AT 1957

Instrumentation

JUSTUS T. VOLLBRECHT, President
Instrument Society of America

THE POWER INDUSTRY has been and still is a pioneer in the measurement, telemetering, and control equipment application. It is quite well known that the "systems engineering" concept has been practiced for many years by both user companies and instrument manufacturers to bring greater efficiency and production in generating power. Fundamental to this concept is the "building block" hardware available to build any required measurement and control system needed.

Probably the most important trend in the instrumentation field for power generation within the next few years will be the rapid development of electronic equipment. These will undoubtedly become important "building blocks." Very soon, complete electronic systems will be available to fill every need.

From present information, electronic instrumentation offers possibilities for great standardization and simplification of components. This in turn, makes for greater flexibility when desired. Transistors, magnetic amplifiers, printed circuits, and other developments will cut down first cost, maintenance, and size. Accuracy, speed of response, and controlability will increase. This will bring better overall performance and operation to power generation.

Instrumentation and automatic control are advancing so rapidly that management must be constantly apprised of new developments if it expects to enjoy the benefits of this, the most dynamic technology in today's American industrial scene. ♦ ♦

Coal for Power

TOM PICKETT, Executive Vice President
National Coal Association

PRIMARILY AFFECTING the importance of coal as a power fuel during the next two years is the almost explosive increase in demand for electric energy in all phases of our economy . . . . this trend expected to accelerate annually. Forecasts are that present requirements will double in ten years. To meet these demands, the utility industry is rapidly expanding its generating facilities . . . by constructing new generating stations and enlarging the capacity of existing ones, and by increasing length and capacity of transmission lines. Today coal supplies fuel to generate more than half of the electric energy throughout the nation and better than four-fifths of that generated east of the Mississippi River.

New generating stations are being located in growing numbers where water transportation is available. Others, as well as industries generating great quantities of power, are being constructed adjacent to coal deposits where mines can be put in operation. Result is lower transportation cost . . . . hence lower fuel costs.

The coal industry is improving its production efficiency by rapidly mechanizing mining processes. Together with better preparation, this insures high volume and stabilized quality.

Domestically produced competitive fuels for generating plants are diminishing and their costs are rising. For an unforeseeable length of time, petroleum demands of Western Europe will have some effect on both supply and cost of our domestically produced petroleum, as well as that which has heretofore been imported. Readily available sites for hydro-electric power are almost all exhausted.

Much discussed power generation from nuclear energy will not be a competitive factor within the next two years, nor for some time to come.

These are among important factors that have increased coal's use for power generation from 88 million tons in 1950 to 140 million tons in 1955. Estimates are that the utility industry will use 157 million tons in 1956. These factors make evident that coal will continue to increase in importance as a power fuel during the years ahead. ♦ ♦

Electric Utility Supply

EDWIN VENNARD, Managing Director
Edison Electric Institute

INVESTOR-OWNED electric companies look ahead to 1957 and 1958 with optimism. Based on the record of recent years, and barring any worsening of the international situation, we anticipate that the nation will go forward with industry providing goods for a higher standard of living.

Industry takes a major share of electric utility generation. Although industrial customers constituted less than 1% of total electric industry customers in 1955, power sales to this group were 52% of total energy sold. Sales to industry amounted to nearly 250 billion kwh, almost 25% over the previous year. An ever-increasing number of manufacturing tasks formerly accomplished by less efficient methods are now being powered by electricity. The advance of automation in industry will continue, and will require increasing amounts of electric power.

Net generating capacity of investor-owned electric companies increased from 40,307,000 kw at the end of 1945 to 86,887,000 at the end of 1955. This is an average increase of 4,658,000 kw per year. New generating capacity scheduled for addition in 1957 and 1958 totals 7,111,000 and 12,530,000 kw respectively.

During the postwar decade through 1955, these companies spent over $21 billion for new plants and equipment. In the decade from 1956 through 1965, they expect to spend $40 billion on expansion to meet the nation's growing demand for electricity.

Increased power use by industry is the result of combined effort. Industry is continually developing new methods of using electricity. Electric companies, on their part, encourage greater power use. Utility company representatives work with industry in searching for more efficient methods, and to find new markets for manufacturers' products.

The nation's fast-growing population, high level of employment, and record-high wages all point to an increasing demand for products of industry in the years just ahead. The demonstrated efficiency and economy of electricity in producing those goods presages a continually growing demand for electric power by industry. ♦ ♦

A star for your convenience

To help you pick out the reprints of INDUSTRY POWER articles that have been made available within the last month, we now place a star in front of each new title in our regular monthly listing of currently available reprints. Turn to page 52 and

look for the stars

this month's comment . . . .

No plateau in sight for '57

The Power Services business is big and it's getting bigger. As we do every January, INDUSTRY POWER looks at prospects for the new year. This year we invited well-known industry leaders to give their comments in INDUSTRY POWER'S Forum.

No matter where you look, evidence abounds that the Power Services business is on a sustained boom that will continue upward during 1957 . . . . and well beyond. One example is the use of electrical energy — we are already one-fourth of the way along a path charted by a General Electric spokesman . . . . who says that each production worker in the United States will use TWICE as much electricity at his job in 1966 as he did in 1954. Consider, also, figures released by the Federal Power Commission:

YEAR	INDUSTRIAL REQUIREMENT	TOTAL REQUIREMENT
1953	196 billion kwh	439 billion kwh
1975	615	1356

And no plateau is in sight!

To find out what industry leaders think about 1957 and the near future, we went to men who represent various aspects of the Power Services. You'll find their answers to our questions on pages 3, 5, and 12. Industry leaders' comments leave no doubt as to their optimism — Continued and accelerated expansion in all fields of industry is a certainty — Emphasis will be on research and development in new uses as well as increased efficiency in present uses — Larger and more expensive equipment is planned, with limits being set only by existing materials.

Beyond bigness, there is a need to grow in our abilities to do *more with less* . . . . not to grow by mere multiplication in kind.

We must extract more energy from each pound of fuel we consume. We must waste less of each erg we transmit. We must use best each watt we deliver.

We are far from a plateau in growth of the Power Services. It is not yet even in sight. Let us perform today so that future generations can double our records . . . . and even then never reach a plateau.

Harold A. Bergen
Editor

Pulsating neoprene panels inside the bin are PneuBin's secret weapon against bin flow bottlenecks. The PneuBin unit consists of steelbacked, neoprene, pulsating panels mounted on the inside wall of your present bins . . . and air controls to regulate the panels' action. By the pneumatic inflation and deflation of the PenuBin panels, the bin contents are positively displaced to insure free flow. After the panels have deflated, the air control unit (operating off the regular plant air supply) starts another cycle of inflation and deflation. The process continues *automatically* at whatever frequency is set on the air controller (this frequency is adjustable).

Because the neoprene diaphragm is resistant to oils and most chemicals and is also thick and tough enough to withstand severe abrasive service, PneuBin is applicable to most any bin flow problem.

Sizes: PneuBin panels are available in ten standard sizes from 4" x 12" to 24" x 72". Special sizes can be made if required in quantity.

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PneuBin— Pneumatic Bin Evacuators

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When their first glass-protected stack proved its superiority in actual use, Oscar Mayer bought another to

Save $9000 and get a better stack

J. T. WEYBROUGH
Assistant Mechanical Superintendent
Oscar Mayer & Co.
with Donald Hartley, Managing Editor

GLASS-COATED STACKS at Oscar Mayer & Co., Madison, Wis., will save $9000 each during life and should last 25 to 30 years. This compares with a 7- to 10-year life span of conventional stacks used before. Two steel, glass-coated stacks were installed. One was 7 feet 6 inches id by ¼ inch by 59 feet 6 inches long, and the other was 5 feet id by ¼ inch by 77 feet 6 inches long.

Larger stack serves No. 5 boiler — a Wickes four-drum, water-tube boiler equipped with Detroit Roto-stokers, Foster-Wheeler superheaters, and Foster-Wheeler economizers. Rated boiler load is 125,000 lb/hr steam. Normal operating conditions are 425 psig steam at 690 F superheater outlet. Fuel gas temperature at the stack base runs 300 to 320 F. Guarantee data specified 182,000 lb/hr flue gas at 14.5 percent Co_2 at rated load.

Smaller stack serves a similar but smaller Combustion Engineering boiler with spreader stoker

(continues on page 42)

It is not for good looks alone, rather for their economy that Oscar Mayer uses glass-coated smoke stacks, as Perma-Glas coating outside and inside never need be painted. Stacks should last at least twenty-five years, or three times as long as conventional ones, giving savings up to $9000 on each one.

First step toward assembly after uncrating is to dope flange joints and put on double asbestos rope gasket.

From General Electric's experience with its 138 plants, discover . . . .

Who your boss is in your waste treatment operations

KENNETH S. WATSON
Water Management & Waste Control
Manufacturing Services Division
General Electric Company
with R. W. De Moss, Assistant Editor

HAVING 138 PLANTS in 107 cities and 28 states, we at General Electric have had wide experience in dealing with the authorities that influence industrial waste disposal practice.

Our nation's ground and surface waters are invaluable, so state and other levels of government must set up rules to protect these resources. Highest priority on these resources is for municipal and industrial water supply. These priority demands are increasing at a tremendous rate. Major responsibility for protecting these critical natural resources is best vested in the state government. State boards can review problem areas with an objective viewpoint and are not swayed unduly by local considerations.

With today's increasing emphasis on pollution control, we might wonder what agency really has jurisdiction over any particular pollution problem. As many as four agencies, in some instances, might have jurisdiction over a particular problem—municipality, state government, interstate compact, or federal government.

This pattern of jurisdiction originates partly in the laws under which particular agencies operate. Pattern, also, is partly determined by the interlocking relationship of one political subdivision to another.

municipalities set own limits

A municipality that accepts industrial waste discharge has the authority to set limits on the wastes it accepts. These limits must be met to protect the sewer system and treatment plant. Some limits have been too restrictive in the past. Sound limits will be in force when a set of limits is adopted to protect the sewer system and another to protect the treatment plant. A municipality has the authority to set specifications, but industry can decide on the control to be used to meet them.

A city most generally regulates industrial wastes acceptance by adopting a sewer ordinance. This ordinance is the basic set of ground rules under which the municipality and its industries work together to solve problems for the entire area. Progressive municipalities today often obtain counsel of industry's engineers in developing a sewer ordinance. Among the features that a sewer ordinance contains are: definitions, list of specifications which industrial wastes must meet for acceptance, service-charge formulas, definition of typical sanitary sewage, and a section prohibiting acceptance of clean water.

Typical service charges are listed in Table I. Such a scale is incorporated in the ordinance. Industries having no special problem in meeting specifications pay on this basis. Industries that have wastes exceeding the strength of sanitary sewage pay a special surcharge rate spelled out in the ordinance.

Table I shows range of analytical characteristics for typical sanitary sewage, spelling out typical concentration and surcharge payment when concentrations are exceeded. This definition varies slightly from city to city.

To discharge wastes that do not contain toxic or other objectionable materials, plant engineers may often pretreat wastes to a point where they are acceptable by the city. Installation of such pretreatment facilities and discharge into the city system is often cheaper than complete treatment and discharge direct to stream.

We should always consider combining with the city to solve problems for the entire area as the soundest approach for everyone. Such evaluation would cover installation and operating costs on both bases. In cases where industrial plant waste load is large and municipality load is small, it is sounder for industry to provide complete treatment facilities and discharge into the stream.

In some instances, a municipality will accept industrial wastes from plants located adjacent to but outside city limits. If such a procedure represents the most economical approach for both industry and city, it certainly should be followed.

TABLE I
TYPICAL SERVICE CHARGE SCHEDULE*

Amount Used (Gallons)	*Cost per 1000 Gallons*
First 5000	$0.20
Next 10,000	$0.20
Next 50,000	$0.17
Next 100,000	$0.15
Next 135,000	$0.13
Next 300,000	$0.10
Next 600,000	$0.08
Over 1,200,000	$0.06

*Some ordinances also establish a minimum sewer service charge.

CHARACTERISTICS FOR NORMAL SANITARY SEWAGE

Constituents	*Range*
Suspended Solids	180 to 350 ppm
B. O. D.	140 to 300 ppm
Chlorine Demand	5 to 15 ppm

set up sanitary districts

Consistent with collection system cost, it is often more economical for sewage and wastes from an entire area to be treated in a common plant. Most state laws provide for setting up sanitary districts to serve areas that are greater than those within the limits of cities. The major municipality usually has some leadership responsibility in the joint move toward improving the entire area. Sanitary board members generally live within the board area. In most cases, state waste control representatives are highly competent and their counsel is helpful.

Outstanding example of a sanitary district at work is the Allegheny County Sanitary Authority in Pittsburgh, Pa. Sixty-eight municipalities are already parties to this Authority. Two other cities probably will join them. Some 20 industries have agreed with the Authority to connect directly into the system. This brings the total number to over 100.

Industries outside municipal limits and connected into Authority system are responsible to the Author-

(continues on page 40)

Municipality's primary settling tanks, with chlorine treating house (background), can be made attractive.

How Hooker Electrochemical's Niagara plant

Reduces blowdown 65% and chemical treatment 48%

DONALD E. SPRINGER, Chief Engineer

RAYMOND S. BRIGGS, Assistant Chief Engineer

A. W. PEARSALL, Project Engineer

RICHARD W. LYKE, Plant Engineer

CHARLES KRELL, Boilerhouse Chief Engineer

Hooker Electrochemical Company, Niagara Falls, N. Y.

with Donald Hartley, Managing Editor

PHOSPHATE CONSUMPTION for internal boiler treatment has been cut 90 percent and blowdown has been reduced from 14 to less than 5 percent—a 65-percent reduction—at Hooker Electrochemical Co.'s Niagara Falls plant.

Hooker's processes demand large quantities of steam for evaporating chemical solutions. Since 1937, boiler feedwater was conditioned by a hot lime-soda system with a rated water capacity of about 80,000 lb/hr. Water is obtained from the Niagara River and has an average hardness of about 125 ppm (see Table I). The hot lime-soda system reduced hardness to about 25 ppm. When supplemented with internal boiler treatment, it produced satisfactory water for the existing boilers.

why better water?

About five years ago, however, a 235,000-lb/hr 150-psig boiler was installed. This raised total boiler capacity to more than 500,000 lb/hr. Makeup steam requirements were now 2.5 to 3 million lb/day, about 30 to 50 percent more than capacity of the lime-soda water conditioning system. Water had to be used before normal retention period had elapsed. In peak demand periods, some untreated river water had to be used. As a result, boilers were using water of nearly 30 ppm hardness, which is much too high.

TABLE I

Niagara River Water

Ca^{++}	90.0 ppm	HCO_3^-	97.5 ppm
Mg^{++}	33.3	SO_4^{--}	22.9
SiO_2	20.0	Cl^-	9.0
Fe^{++}	0.04	NO_3^-	0.1
Na^+	14.2	Total Diss. Solids	165.0
K^+	1.5	Total Hardness	123.0

To counteract hardness and reduce scale formation with attendant higher fuel costs and possibility of boiler tube burnout, sodium hexametaphosphate consumption for internal boiler treatment was increased to about four times normal level. This raised water treatment cost unreasonably and required excessive blowdown of nearly 14 percent, which added to fuel costs. Boiler was designed for future operation at 600 psig, and a fourth boiler designed for 600 psig was projected.

bigger system, better water

Clearly, the time had come to replace the existing water conditioning system. One with considerably higher capacity and, equally important, that could supply water suitable for high-pressure service was needed. A new Graver Water Conditioning Co. system was installed with a capacity to soften more than 550,000 lb/hr water down to a fraction of one percent hardness. This new system can condition seven times as much water as the old system, and its effluent has virtually zero hardness. Beside reducing phosphate consumption 90 percent and blowdown 65 percent, system reduces scale formation to a negligible rate. Boiler maintenance costs are lower as a result. Table II compares chemical costs for operating the new and old systems. Savings of 48% were obtained.

Hooker's installation is a two-step softening process involving hot-lime precipitation followed by Amberlite-ion exchange. Initial softening step, which reduces hardness to about 50 ppm, is carried out in a 27-ft dia Sphericone tank 38 feet high. All the incoming water enters at top and is superheated to 230 F by steam jets to remove some dissolved carbon dioxide and oxygen. At this point, it mixes with a dolomitic lime slurry, proportioned to the water flow, which precipitates much of the hardness and silica as the water descends. At the tank bottom, the water reverses direction and rises through a 6-foot sludge blanket that traps the precipitated material. Inverted cone tank shape, an exclusive Graver design, reduces effluent turbidity to about 3 ppm, as compared with 10 ppm in conventional hot-process lime softeners. As water rises in this cone, its flow rate decreases in proportion to the square of the tank's radius. Resulting deceleration aids in settling out progressively smaller particles so effluent is exceptionally clear.

Effluent flows from this Sphericone sedimentation tank, by gravity, through four 10-foot dia Anthrafilt filters for final clarification. A 1500-gpm pump cir-

TABLE II

CHEMICAL TREATMENT COSTS

with Former Hot Lime-Soda System

Hexametaphosphate	150 lb at 14.7 ¢/lb	$22.05
Lime	130 lb at 5.0 ¢/lb	6.50
Soda Ash	100 lb at 1.75 ¢/lb	1.75
Sodium Silicate	14 gal at 25.5 ¢/gal	3.57
		$33.87 per day

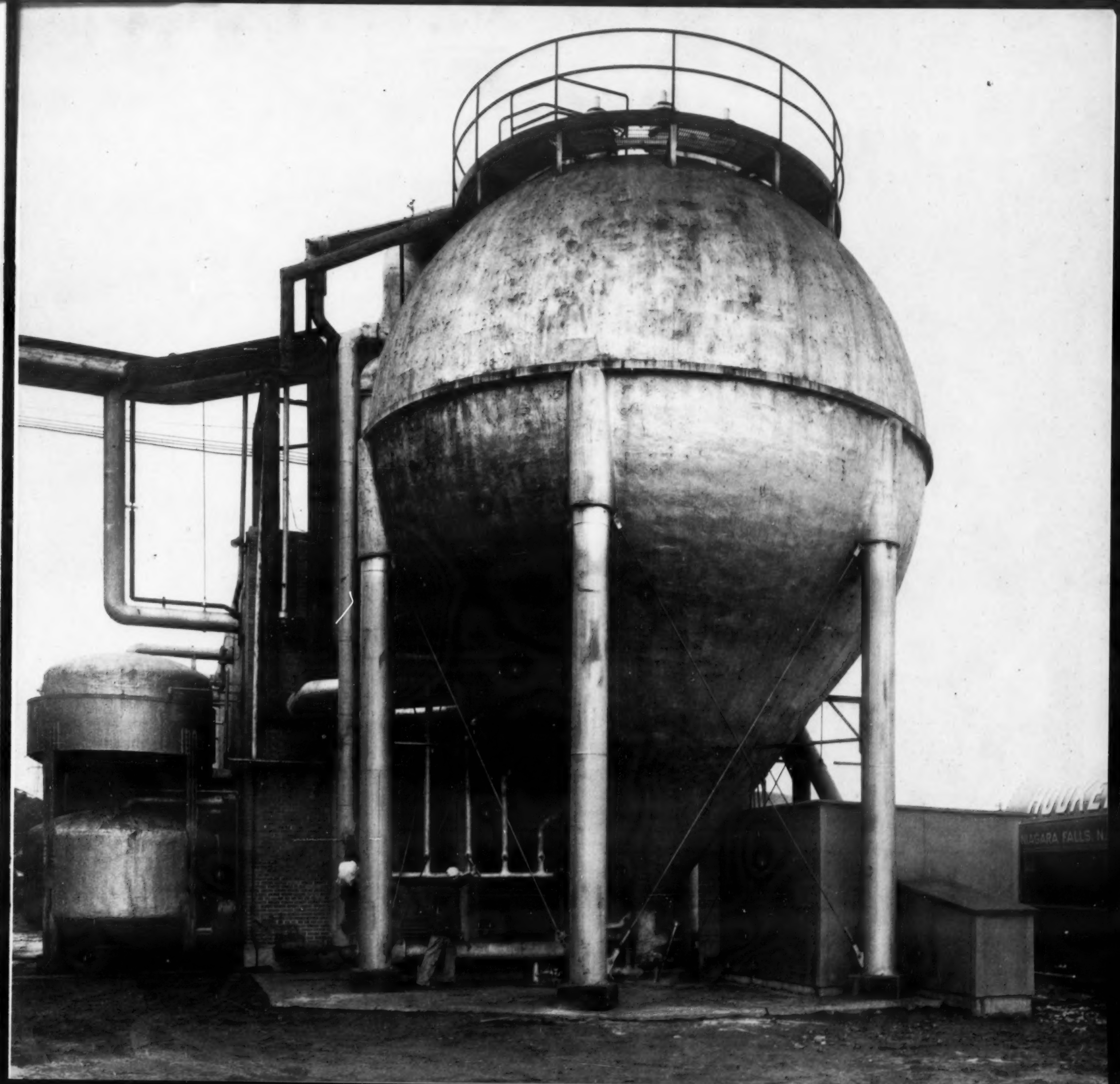
Cost per 1000 lb makeup water = $0.0070 per 1000 lb

with Hot-Lime Ion-Exchange System

Hexametaphosphate	15 lb at 14.8 ¢/lb	$ 2.205
Lime*	288 lb at 5 ¢/lb	14.400
Brine for regeneration	488 lb at .28 ¢/lb	.880
		$17.485 per day

*Lime is now being purchased in carload lots at 1 ¢/lb but is listed as 5 ¢/lb for comparison with former costs.

Hot lime sedimentation in Sphericone initially softens influent down to about 50 ppm and reduces silica.



More protective devices, higher voltages, increased versatility and convenience, improved operating efficiencies, reduced downtime . . . .

Watch these trends when you buy your next motor

CHARLES D. LAWTON
Application Engineer
Allis-Chalmers Manufacturing Company
with R. W. De Moss, Assistant Editor

WHETHER YOU ARE building a new plant or adding to an existing plant, your selection of electric motors is affected by strong trends today . . . . trends traceable to economic pressure that calls for more reliable performance. In response to these trends, you are buying motors with more protection, for higher voltages, with increased versatility and convenience built in. You are finding that higher initial costs are paying out in reduced downtime.

Many factors enter into motor selection. New plants, additions to old plants, indoor or outdoor installation, and ambient atmosphere raise fundamental questions. The answers produce trends.

In a new plant, you have a free hand in designing a new and complete electric system. You use the latest information on design practices to gain the most economical operating efficiency. This produces a trend toward higher voltages for larger motors. A new, large plant very often will use 4000 volts to supply motors above 200 hp and 440 volts to supply motors 200 hp and below. A 2400-volt system will not be used. The 4000-volt motor will cost more, but compensating savings will be gained through better voltage regulation plus cheaper distribution systems and control equipment. Due to better voltage regulation, your motors will operate at higher efficiency, correspondingly reducing power bills. Expanding a 4000-volt system is easier than expanding a 2400-volt, if required later.

If an addition is made to an existing plant that already has 2400-volt power distribution, it is quite likely that the old power system will be extended and that the new motors will be purchased to operate on existing 2400-volt system.

Two 700-hp, 4160-volt, 390-rpm outdoor vertical motors drive water pumps for a western power station.

preventive maintenance pays

Since motors represent a high investment, users are taking better care of them. Preventive maintenance programs to detect trouble sources before trouble starts are entering the picture. Bearing oil is inspected and analyzed more frequently. Bearings are regularly inspected for oil leaks. Windings themselves are inspected for dirt and cleaned when necessary. Filters, where used, are cleaned. Protective relaying equipment is inspected to assure proper operation. These are some of the things that are done on schedule and reported to management so that equipment operating condition is known at all times. Steps then can be taken to correct defective conditions before failure occurs. This is true economy. . . . preventing costly shutdowns and production loss. These programs are producing dollar savings over older hit-and-miss maintenance schedules where motors run continuously until they are in trouble or fail.

more protective accessories are used

Motors are being purchased today with more protective accessory equipment than ever before. Protective devices cost little, but save thousands of dollars in preventing production loss and motor damage. Accident prevention is proving to be worth many times the cost of small, accessory motor protective equipment. Such equipment includes bearing temperature relays or detectors, stator winding temperature protection, space heaters to protect motors from damaging condensation during shutdown, speed-limit switches, plugging and antiplugging switches, differential protection, surge protection, and oil flow and water flow indicators. This protection is extended to electrical as well as mechanical features.

Differential protection at the motor is most com-

(continues on page 38)

When a Middle-Atlantic seaboard plant, a New York food processor, a Midwestern powerhouse, and a five-plant company all save money, you, too, might do well to . . . .

TRY a plant operating SURVEY

DOUGLAS HENDERSON, President
Fuel Engineering Company of New York
with John Runyan, Assistant Editor

GREATEST POTENTIAL ECONOMY in running your steam plant lies in improving fuel purchasing policies . . . . simply because fuel is your largest single operating expense. Many plants have found a plant operating survey is an invaluable aid in guiding fuel purchasing policy. This, essentially, is a method of securing all the important information that establishes a steam plant's normal operating standards.

Heat balances may reveal extent and location of combustion losses, and may identify those that can be controlled. But a plant operating survey will show:

a) best practical economy under existing conditions,
b) changes or alterations that can be justified,
c) if conversion to different fuel is advisable.

establish plant fuel ranges

Every coal-burning steam plant has a range of fuel characteristics within which equipment already installed can meet steam demands efficiently and economically. If this range is restricted to narrow limits, fuel purchases may be confined to premium priced grades. If range is too broad, operating difficulties may result. Plant fuel characteristics, therefore, must be accurately defined to allow widest possible purchasing latitude.

One function of plant operating surveys is to determine if any restrictions are imposed on fuel selection by steam generating equipment and operating requirements. Here are several examples which point up economies that can be gained from plant operating surveys.

For one Middle-Atlantic seaboard company, a steam plant survey was made covering their three boilers; one 7200 lb/hr, one 10,400 lb/hr (both burning coal), and one 26,500 lb/hr (burning fuel oil). Steam is used for space heating and process.

Steam is generated at 120 psi and 400 to 450 F from feedwater at 200 F. Fuel costs were $11.23/ton for bituminous coal and 6.73¢/gal for No. 6 oil. Heat contents were 13,875 Btu/lb and 151,300 Btu/gal. Relative values were 40.5¢ /million Btu for coal and 44.5¢ /million Btu for oil.

Long-acquired habits had lulled operators into relying on the oil-fired unit the year round. They put the coal-fired boilers on the line only when plant demand exceeded oil-burning boiler capacity.

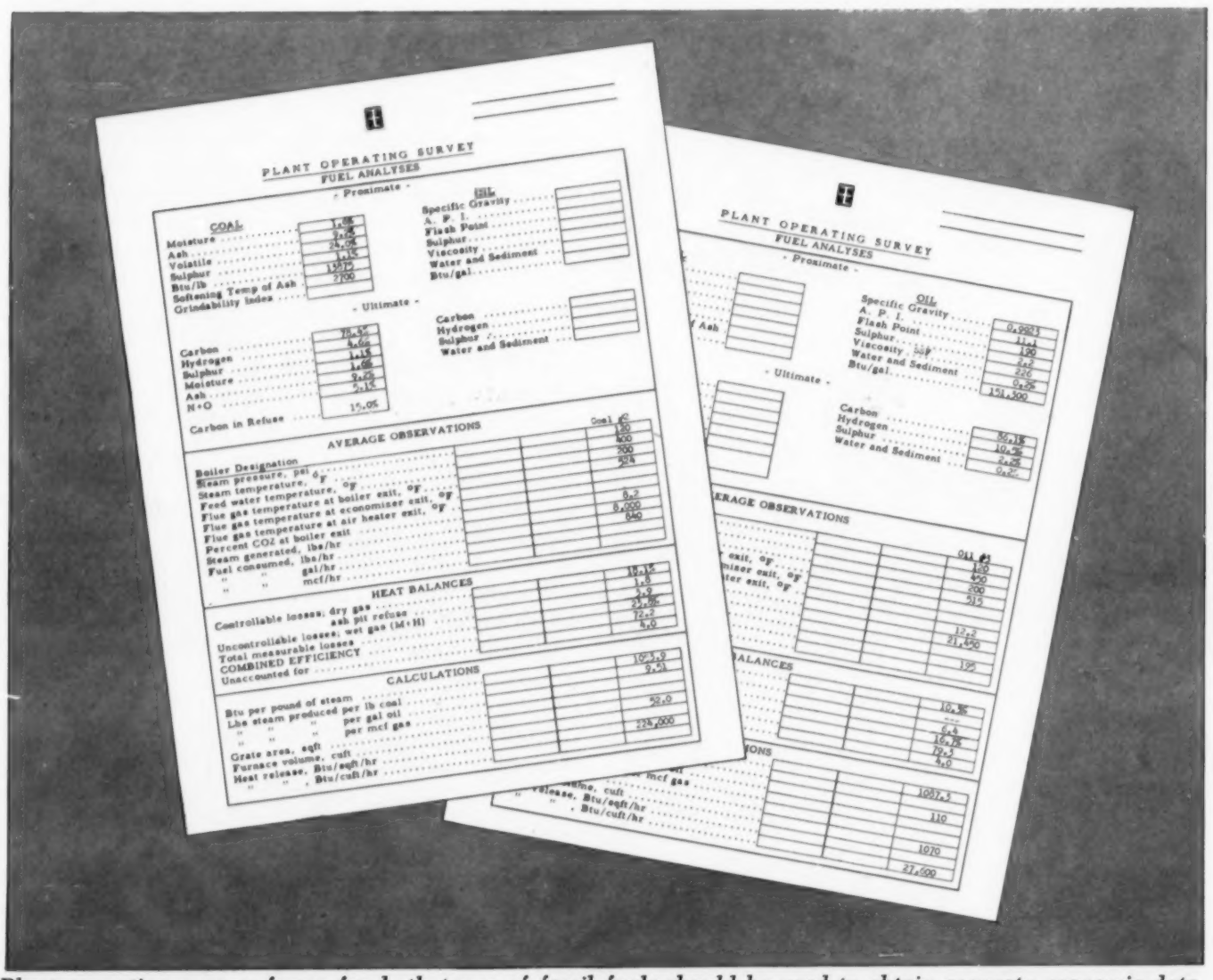
Schedule of steam produced per hour, based on 1955 monthly averages, showed:

Jan.: 29,450 lb/hr	July: 10,660 lb/hr
Feb.: 28,820	Aug.: 9,680
Mar.: 27,450	Sep.: 12,890
Apr.: 20,750	Oct.: 16,340
May: 11,920	Nov.: 23,880
June: 11,860	Dec.: 28,120

Fuel to produce this steam cost:

Oil:	(1,060,000 gals @ 6.73¢)	=	$71,340
Coal:	(1070 tons @ $11.23)	=	$12,020
			$83,360

Based on these figures, a program was recommended to management whereby coal-burning boilers would take over during periods of reduced steam



Plant operating survey forms for both types of fossil fuels should be used to obtain accurate economic data.

demand. This switch would reconstruct cost figures as follows:

Oil:	(808,330 gals @ 6.73¢)	= $54,400
Coal:	(2340 tons @ $11.23)	= $26,300
		$80,700

This difference ($2660) represents operational savings. Better coal prices available further reduced their coal cost by $1.00/ton. Applying this to 2340 tons brings total savings attributable to the plant operating survey to $5000.

New York food processor

An 18-percent savings in annual fuel bill was effected by a small New York food processing plant as a direct result of a plant operating survey. Field investigation showed that fuel oil was more economical than coal for this plant. Combination of fuel relationships, economies in labor, and ash disposal elimination were factors in this decision. Savings of $14,500 were made.

midwestern powerhouse

One plant operating survey function is to determine if any restrictions are imposed on coal selection by steam generating equipment or operating requirements. Here is the experience gained by one midwestern powerhouse using approximately 40,000 tons/yr of bituminous coal.

Field investigation shows no particular limitations on coal quality. Pulverizers have ample capacity to handle low-grindability coals. Plant operating records are very complete, and indicate efficiencies of 84 percent.

Lower cost coal from a different producing area was recommended following a coal-buying review in the plant. New coal had the same characteristics as the old. A trial supply was ordered. Tests were conducted by regular plant operators. Results conclusively showed that yearly savings of more than $24,000 could be made.

five-plant survey

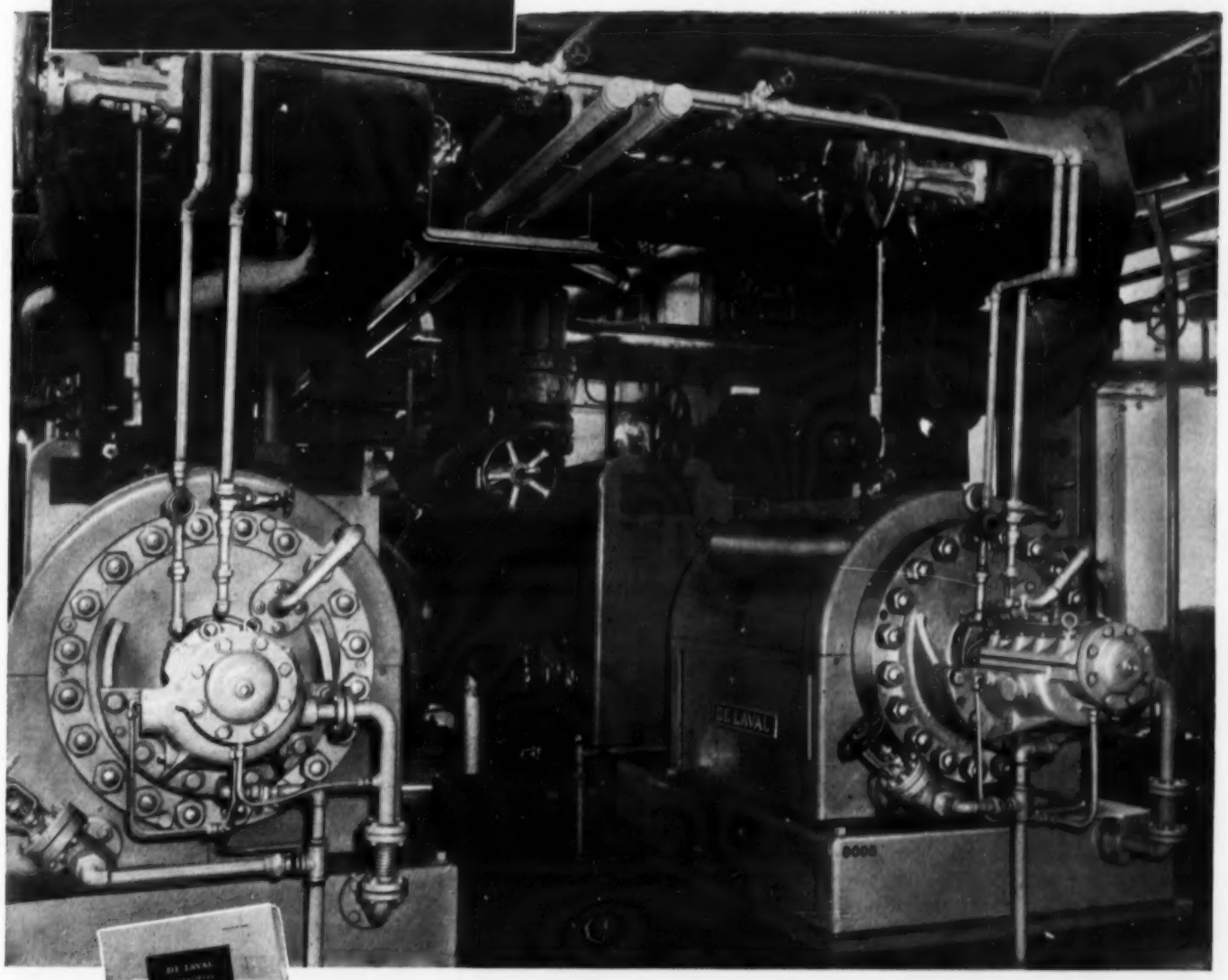
When more than one plant is involved, savings indicated by plant operating surveys can pyramid quickly. A survey was made for a multiplant company with five plant locations in the East and Midwest. Purpose was to recommend improvements in both fuel selection and steam generating operations. Field investigation indicated possible 15-percent savings by shifting to fuels from other producing areas. Changes in normal supply sources were made gradually. At the end of a three-year period, savings of $250,000 were realized. This greatly exceeded original estimates.

From these and other similar experiences, indications are that substantial savings result from periodic reviews of fuel-buying practices. Plant operating surveys are a proven method of providing that review. Obtain similar savings in your plant. ♦♦

DE LAVAL

BARREL TYPE BOILER FEED PUMPS

give dependable service at Gaylord Container



Bulletin contains helpful data

Bulletin 1506 on the De Laval barrel type boiler feed pump covers all major design points . . . has cross-section cutaway illustration for easy reference. Write for your copy.

Here's additional proof of De Laval reliability on the line in the Bogalusa, La. plant of the Gaylord Container Corporation. These two De Laval barrel type boiler feed pumps are both driven by De Laval MCP turbines operating at 850 psi, with steam temperature at 825 F.

• De Laval barrel type boiler feed pumps are widely used by industrial plants and public utilities. They operate at pressures up to 5,500 psi. These units offer many important design advantages, such as double volute diaphragm, individual diaphragm bolting, positive sealing between suction and discharge chamber and bare shaft construction. Their dependability is proven by year-in, year-out service.

DE LAVAL *Boiler Feed Pumps*

DE LAVAL STEAM TURBINE COMPANY

857 Nottingham Way, Trenton 2, New Jersey

DL 528

Circle 102 on READ-N-CIRCLE card for more data

In brief . . . .

ASME Annual Meeting and Power Show

THE NATIONAL POWER SHOW moved into New York's new Coliseum and played to a bigger "house" than most exhibitors could remember for some years. While traffic was heavy at the Power Show, the ASME 1956 Annual Meeting several blocks south, in the Hotel Statler, enjoyed spirited technical sessions and a good measure of the conviviality reminiscent of previous meetings in New York. Here are extracts from some of the papers.

Engineering Eddystone Station . . . . Supercritical water

E. M. Powell, Combustion Engineering, Inc.

"Successful operation of once-through boilers depends on satisfactory water conditioning. . . . Again it is the situation where dispelling the unknown gradually has led to confidence in successful operation at supercritical pressures. Most of the attention now is being directed toward determining safe limits and means for assuring that such limits are met. One of the problems in this connection is developing analytical methods of sufficient sensitivity and reliability. Concentrations to be measured accurately are extremely low in terms of past practice.

"Solid matter in the system must be minimized to prevent objectionable deposits in the boiler and the turbine. There are four recognized sources for introduction of solid matter, the most critical of which could be condenser leakage. The extreme importance of regulating this item has been recognized. Full attention is being given to insuring absolute tightness of tube joints including coating of the tube sheet with a resilient sealing material. The hot well under the condenser has been sectionalized so that any localized source of contamination can be isolated. The contaminated water will then be removed from the system where it can be filtered and demineralized. . . .

"Next to condenser leakage, metal pickup from corrosion has been considered by many to be the greatest source of solids in the water. As with today's conventional systems, the preboiler system will be an important source of this material. The same causes will apply and therefore will be subject to the same curative measures. Dissolved oxygen in the feedwater should be limited to 0.005 ppm and pH controlled to 9.0 to 9.5. Eddystone is designed for deaeration of the feedwater in the condenser and again in a deaerating heater. Makeup will be introduced into the condenser to eliminate all possible sources of oxygen. It is proposed that ammonia be used for pH control with the possible addition of hydrazine as an oxygen scavenger.

"A third source of contamination is makeup water. Demineralizing equipment is being installed to provide normal purity of 0.04 ppm with a maximum of 0.10 ppm. . . .

"The solution of organic resins in the demineralizers is a fourth possible source of contamination. This will not be a problem in the case of the makeup, but there has been some experience indicating that it could become one in the case of the bypass demineralizer owing to the large volume of pure water passed through."

J. W. Barker, past president, D. A. Quarles, Air Force secretary, W. F. Ryan, incoming president, and C. E. Davies, ASME secretary, at ASME banquet.

Second floor of Power Show at New York's Coliseum gets ready for the crowd just as the doors are opened.

Engineering Eddystone Station . . . . Supercritical turbine

C. B. Campbell, C. C. Frank, Jr., and J. C. Spahr, Steam Div., Westinghouse Electric Corp.

"Preliminary studies which established the demands on the [turbine] control system indicated that here also a new approach to the design must be made to insure proper operation, control, and rate of response of the control elements of the unit. Conventional operating oil pressure units were entirely inadequate to maintain reasonable proportions of servomotors and would result in motive oil

requirements beyond the capacity of existing systems. A main operating oil pump pressure of 300 psi was selected, making available sufficient differential operating oil pressure to permit use of servomotors of less than one-half the physical size which would be required if existing design pressure levels were applied. . . .

"All steam control and stop valves and their servomotors are located above the floorline. All interceptor valve servomotors are located on pedestals which eliminates external piping to these mechanisms. Because of the size of servomotors used, the piping to those located at the control and stop valves is greatly reduced in size and can be grouped and isolated from high-temperature parts. Likewise, all servomotors will be isolated by steel jackets.

"Provisions are made to periodically check the operation of all stop, interceptor, and governing valves while the unit is carrying load. All "exercising" of these valves is accomplished from a central control panel. The operative position and functioning of these valves is traced and indicated by mechanical indicators and lights located on this panel. Safety in operation has been built into the control center which allows the operator to close only one stop valve and its companion steam flow control valve, one at a time, while all other valves are maintaining their normal operating functions.

"A full complement of Turbo-Graf supervisory instruments is provided. These instruments are of latest design and permit calibrations and testing while the unit is in operation. These instruments are designed to both indicate and record the characteristic operation of the unit. The instruments are provided with connections for both alarm and trip circuits. These instruments will give: (a) characteristic casing expansions, (b) bolt and casing differential temperature, (c) rotor eccentricity, (d) rotor vibrations, (e) rotor position, (f) differential expansion between stationary and rotating parts, and (g) rotor thrust.

"The successful operation of the unit, in conjunction with the boiler bypass system, will depend to a large extent on the data given by these instruments. In addition to the supervisory instruments, we are providing temperature pickups at critical points to permit the operator to take full advantage of the inherent flexibility in the steam generator in being able to match steam temperatures to metal temperatures when starting and shutting down the unit."

Engineering Eddystone Station . . . . Supercritical code problems

J. H. Harlow, Chief Mechanical Engineer, Philadelphia Electric Co.

"Although in all of the design of the Eddystone unit the attempt has been to conform to the letter of existing codes, particularly the ASME Boiler Code and the State Regulations, it is obvious to anyone considering the problem that there are some areas where it is impossible to do so exactly. In such areas the spirit of the Code has been followed, and with the very helpful cooperation of the chief of the Boiler Division of the Pennsylvania Department of Labor and Industry a basis has been developed for answering these variances. The main areas of concern have been the following:

"1) In a once-through boiler the pressure in the various zones of the boiler will be dependent upon their location in the flow path from the economizer to the superheater outlet. It is also recognized that excess tube-wall thickness is not desirable from the point of view of thermal gradients. Therefore, it has been decided to select materials and dimensions corresponding to the pressure by zones.

"2) With different design pressures at the several zones, the hydrostatic test pressure cannot be made equal to 1½ times the design pressure on all zones. A test pressure of 8000 psi has been agreed upon as being satisfactory, being slightly more than 1½

(continues on page 45)

E. C. Smith (left) and D. H. Noble, Industry Power's *Contest winners, inspect equipment at booths.*

Exhibit featuring subcritical nuclear reactor in actual operation claims visitors' interest at the show.

you might be the man
we are seeking to

join our editorial staff

Because of steady growth, INDUSTRY POWER is adding more engineering manpower to its editorial staff. The man we seek is—above all else—a competent graduate engineer with proven abilities in the power services. He may be a mechanical or electrical engineer with inplant experience in managing steam, electric, water, air, fuels, mechanical power, or industrial waste treatment services.

Beyond his technical qualifications, he must have demonstrated facility in handling the English language. He must be able to gather facts, ask knowledgeable questions of other engineers, and put down on paper what he finds out with infallible accuracy. He must have a "nose for news." A speaking acquaintance with photography would help, too.

This is a big order. But the rewards are high. The man selected will be assigned to cover significant engineering events in the power field. He will visit outstanding plants and the newsworthy engineering executives who make the headlines in our business. He will be in correspondence with the fountainheads of engineering progress which INDUSTRY POWER constantly cultivates. He will write and edit on the frontiers of progress in the power field. He will contribute to our program to present the pace-setting editorial coverage of this power business.

Salaries and company benefits are attractive and competitive. To arrange an interview, just send us a resume containing all the facts that show how you might fit the specifications above.

Harold A. Bergen, Editor

INDUSTRY POWER magazine

St. Joseph, Michigan

new bulletins

. . . just circle key numbers on READ-N-CIRCLE card on pages 47 or 48

400-Variac autotransformer data

Variac continuously adjustable autotransformer has special silver alloy contact surface to eliminate oxidation problems. Bulletin O gives engineering specifications for complete line. Twenty-four pages. General Radio Co.

401-How to use hand tools for tubing

Catalog 1140 covers Parker tube cutters, flares, benders, straight-thread tapping, and counterboring tools. Twenty-four pages. Parker Appliance Co.

402-How to select meters

Temperature, viscosity, pressure, and registration data in Bulletin OG-400 aid in selecting meters for any use. Tables and charts show best case, piston, and chamber for specific liquids. Sixteen pages. Rockwell Manufacturing Co.

403-Standardized sheave specification guide

Over 739 QD Fort Worth standardized sheaves in sizes from 3.4 inch to 6 feet in diameter are described in Catalog 83-A. Dimensions and weights for all sheaves are given for A, B, C, and D section V-belts. New industry standardization makes all sheaves fully interchangeable with sheaves from other QD manufacturers. Sixteen pages. Fort Worth Steel & Machinery Co.

404-Centrifugal fan performance charts

Detailed performance charts in Bulletin C-103, Supplement 1, aid in selecting the correct blower fan for your requirements. Fans are suitable for belt or direct drive. Forty pages. Chicago Blower Corp.

405-Remove copper deposits in one step

Copper-complexing agent, added to solvent used in single-stage acid-fill cleaning job, removes copper with usual water-formed deposits. Tables summarize corrosion rate tests using new copper-complexing agent. Eight pages. Dowell Inc.

406-Get more from your plant lighting

Bulletin V-501 stresses importance of plant lighting as a tool for increased production. Includes sections on safety and visibility factors; plant lighting standards; uses and maintenance of fluorescent, incandescent, and mercury vapor lamps. Twenty-eight pages. Sylvania Electric Products Inc.

407-Control coal dust easily

Chem-Jet system for controlling coal dust from receiving point to boiler is described in Bulletin CJP-1001. Also describes specialized unit for controlling low-micron dust and fumes at breaker buildings and coal bunkers. Six pages. The Johnson-March Corp.

408-Centralized lubrication for small machines

Bulletin 4C describes Bijur's cyclic and one-shot lubricators for small machines. Includes specification tables and installation details. Gives data on bearing requirements, volume of oil discharge, and lubrication frequency. Twenty-four pages. Bijur Lubrication Corp.

409-How to choose right transformer

Wiring diagrams and voltage regulation curves in Bulletin GED-2767A aid in selecting proper transformer for your application. One section gives similar data on new refrigerator transformers and on normal, high-reactance, and encapsulated transformers for mines, pumphouses, and similar locations. Thirty-two pages. General Electric Co.

410-How to install weighing systems

Bulletin 561 describes many arrangements possible with Emery tank and bin weighing systems. Weighing system package includes choice of instrumentation from eight different manufacturers. Bulletin shows proper method of applying load cells to different tank types. Twelve pages. The A. H. Emery Co.

411-Demineralize with electric membrane

Bulletin 3 gives performance and cost data on electric membrane plants in capacities from 2500 to 2 million gallons of demineralized water daily. Uses input water with 1000 to 10,000 ppm total dissolved solids. Twenty pages. Ionics, Inc.

412-How to solder aluminum and copper

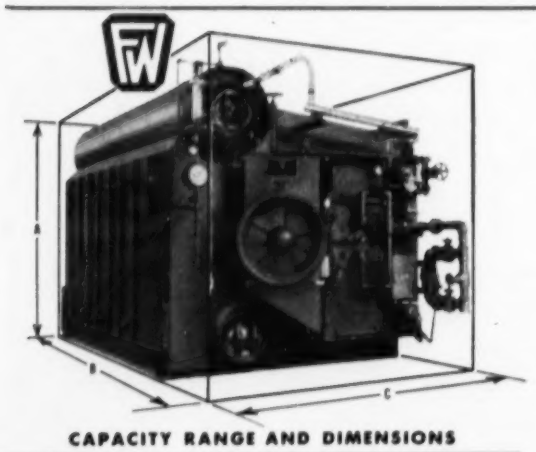
Step-by-step pictures show how to weld Tweco-Lite aluminum welding cable to copper terminals and arc welding accessories. Bulletin A-100 recommends solders and fluxes. Tells how to solder aluminum to aluminum and copper to copper. Two pages. Tweco Products Co.

413-Pocket-size data guide to pumps

Bulletin 5000 describes characteristics, construction, sizes, and capacities of six major types of Dorr-Oliver pumps. Includes performance range and power requirement charts. Twenty pages. Dorr-Olive Inc.

414-Install fuses with gloves on

Perforations in fuse links package allows link to pop out into worker's hand. Ampere ratings are stamped in large letters on carton ends. Bulletin FC-5 describes



SAVE TIME · SAVE SPACE · SAVE MONEY

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PACKAGED STEAM GENERATOR

CAPACITY RANGE AND DIMENSIONS

CAPACITY lb/hr Based on 100 psi, 212F Feedwater and Zero Blowdown		A	B*	C
#6 OIL FIRED	NAT. GAS FIRED			
13,400	12,900	12' 1¼"	14' 6¼"	10' 11¼"
15,800	15,000	12' 1¼"	15' 7½"	10' 11¼"
17,800	17,100	12' 1¼"	16' 8¼"	10' 11¼"
20,000	19,200	12' 1¼"	17' 9"	10' 11¼"
21,800	20,700	12' 1¼"	18' 9¼"	10' 11¼"
24,000	22,800	12' 1¼"	19' 10½"	10' 11¼"
26,200	24,900	12' 1¼"	20' 11¼"	10' 11¼"
28,400	27,000	12' 1¼"	22' 0"	10' 11¼"
30,800	29,100	12' 1¼"	23' 0¼"	10' 11¼"
32,800	31,200	12' 1¼"	24' 1½"	10' 11¼"
35,000	33,300	12' 1¼"	25' 2¼"	10' 11¼"
37,200	35,400	12' 1¼"	26' 3"	10' 11¼"
39,400	37,500	12' 1¼"	27' 3¾"	10' 11¼"
41,600	39,600	12' 1¼"	28' 4½"	10' 11¼"
43,800	41,700	12' 1¼"	29' 5¼"	10' 11¼"
46,000	43,800	12' 1¼"	30' 6"	10' 11¼"

*Varies with method of firing and type of combustion controls. Figures listed provide safe approximation over firing and forced draft equipment.

Here's a *complete line* of packaged steam generating units that are built to power boiler standards . . . designed and constructed to offer these important savings.

You *save time* because they are shipped completely assembled, all ready to set on a simple foundation and connect to your fuel, steam and electric power lines.

You *save space* because all packaged units are extremely compact—designed for shipment on standard railroad flat cars. They provide high output in lowest possible installation space consistent with safe rates of heat liberation.

You *save money* because all units are shop fabricated from standard parts, simple to install, and designed for sustained high efficiency and exceptional ease of inspection and servicing.

In addition to the standard units listed here, FW Packaged Steam Generators are also available for design pressures to 1300 psi, with superheaters giving up to 825 F final steam. FW extended surface economizers provide maximum efficiency at these higher pressures and temperatures. For complete information send for Bulletin No. PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

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Circle 118 on READ-N-CIRCLE card for more data

L-M fuse line, including EEI-NEMA types K and T. Lists dimensions, time-current curves, construction features. Sixteen pages. LINE MATERIAL CO.

415-Motor controls manual

Manual GEA-6372 explains functions of motor control and types available. Describes manual, magnetic, and reduced-voltage starters; pushbuttons; relays; limit switches; solenoids; pressure and vacuum, float, plugging, and antiplugging switches. Thirty-two pages. GENERAL ELECTRIC CO.

416-Tables simplify drive selection

Condensed Catalog 60 gives prices and selection data for normal speed electric motors, geared motors, variable-speed transmissions, and speed reducers. Easy-to-read tables make drive selection easy. Twenty pages. STERLING ELECTRIC MOTORS, INC.

417-Refractory selection guide

Bulletin RB-20 gives classification, properties, and applications for 19 standard brands of Remmey refractory brick. Also describes Remmey refractory shapes, cement, catalyst carriers, heat exchange pebbles, furnaces, and kilns. Eight pages. RICHARD C. REMMEY SONS CO.

418-Corrosion-resistant plastic pipe

Catalog C-14 covers Haveg corrosion-resistant plastic pipes and fittings, valves, fume systems, tanks, towers, and heat exchangers. Includes data on chemical-resistant cements. Tells how to construct plastic equipment in the field. Thirty-two pages. HAVEG INDUSTRIES, INC.

419-Offer engineering design service

Kaiser Engineers will assume turnkey responsibility for industrial projects, will tackle any engineering and construction problem. Bulletin 107GB describes operation of these engineering specialists, reviews major projects. Thirty-six pages. KAISER ENGINEERS DIVISION OF HENRY J. KAISER CO.

420-Nuclear reactor terminology

New booklet banishes fog surrounding nuclear reactor terminology. Gives thumbnail profiles of common reactor types. Tells in nontechnical language essential reactor features. Eight pages. MINNEAPOLIS-HONEYWELL REGULATOR CO.

421-Steel shelving, bin, workbench manual

Steel shelving, drawers, lockers, workbenches, tables, and other furniture items are analyzed in Reference Manual 485. Forty-eight pages. EQUIPTO.

422-Clutch engineering manual

Manual covers automatic freewheeling clutches, combination clutch-couplings, backstops, and new enclosed freewheeling clutch units for continuous operation without downtime. Schematic drawings plus tables of dimensions and weights give installation details. Seventy-six pages. MARLAND ONE-WAY CLUTCH CO.

423-How to select ac motors

Bulletin B-2103-1 gives selection data for motors in frame sizes from 182 to 6085. Includes speed-frequency relationship, NEMA design classes, torque characteristics, NEMA current and torque values, frame selection tables, and dimension charts. Twelve pages. RELIANCE ELECTRIC AND ENGINEERING CO.

424-Rubber biscuits cut coupling wear

Morflex couplings use preloaded rubber biscuits to absorb misalignment and torsional load fluctuations for vibration-free power transmission. Catalog C41-56 gives dimensions and specifications on standard, double, and radial couplings. Torsional deflection charts tell how to select coupling to control torsional vibration. Twenty-four pages. MORSE CHAIN CO.

425-Foolproof filter control

Bulletin 6319 describes Cochrane vertical pressure filters with underdrain having slotted convex or domed diffuser plate welded to bottom head. Design eliminates need for concrete subfill. Drawings show arrangements of two, three, and four header units. Four pages. COCHRANE CORP.

426-Axial fan performance data

Dimension charts, performance tables, ratings, and operating data on eight Axial Airfoil fans are included in Bulletin AA-102. Fans have an air-moving capacity of 1200 to 100,000 cfm. Twenty pages. CHICAGO BLOWER CORP.

427-Pumping viscous materials?

Series HP pumps will pump viscous materials to 30,000 SSU. Controlled-capacity pumps have 2-, 3-, and 4-inch pump strokes. Pumps handle pressures to 35,000 psi, capacities to 2000 gph. Catalog HP-1254 gives complete engineering data on this line. Eight pages. PHILADELPHIA PUMP & MACHINERY CO.

428-Lubricated plug valve operating data

Reference Book 39-5 shows 100% pipe area, venturi, round port, and diamond port Homestead lubricated plug valves. Lists valves for 150-psi steam working pressure, 200-psi owg, ASA 150, 300-psi classes. Twenty-eight pages HOMESTEAD VALVE MANUFACTURING CO.

429-Rubber gloves give extra safety

Catalog describes Charco method of electrical testing of sleeves and gloves, Charco natural rubber gloves withstand voltages to 50,000 ac and 100,000 dc. Catalog gives tips on selection, maintenance, and inspection of gloves and sleeves. Thirty-two pages. CHARLESTON RUBBER CO.

430-Motor housing is corrosion resistant

Bulletin 520 describes Series 254-U all-weather rerated motors. Specially treated corrosion-resistant steel housing protects against weather. Integral metal and cast iron parts also are given anticorrosion treatment. Eight pages. ROBBINS & MYERS CO. ♦♦

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a job for the
RANNEY
METHOD
Conventional Collector. Proven by industries the world over, the collector that yields more naturally filtered water, with less equipment, less personnel, and fewer pumps than any other conventional collector.
A Few Industries Now Using the Ranney Method
Granite City Steel Co.
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Wheeling Steel Corp.
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Allied Chemical & Dye Corp.
Monsanto Chemical Co.
Mead Corp.
MacMillan & Bloedel Ltd.
E.I. DuPont de Nemours & Co.
Olin Mathieson Chemical Corp.
Timken Roller Bearing Co.
Infiltration Gallery. The gallery, engineered by Ranney, provides industry a low cost water supply. The gallery provides large quantities of clear non-turbid water in a revolutionary yet economical way, and it requires no maintenance.
Ranney Intake. The Ranney Intake, already has proven that plants and factories can obtain surface water both efficiently and economically. The Ranney Intake can usually fit into the design of your engineering department or consultant.
Ranney Vertube. Small industry and low volume users can now have a natural gravel vertical water well at low cost. Engineered with the same Ranney precision that has made their method a must for industry.
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Circle 115 on READ-N-CIRCLE card for more data

new products

. . . just circle key numbers on READ-N-CIRCLE card on pages 47 or 48

SPECIAL NOTICE
INDUSTRY POWER's new products section this month features outstanding items highlighted at the Power Show in New York

700-Read liquid level remotely

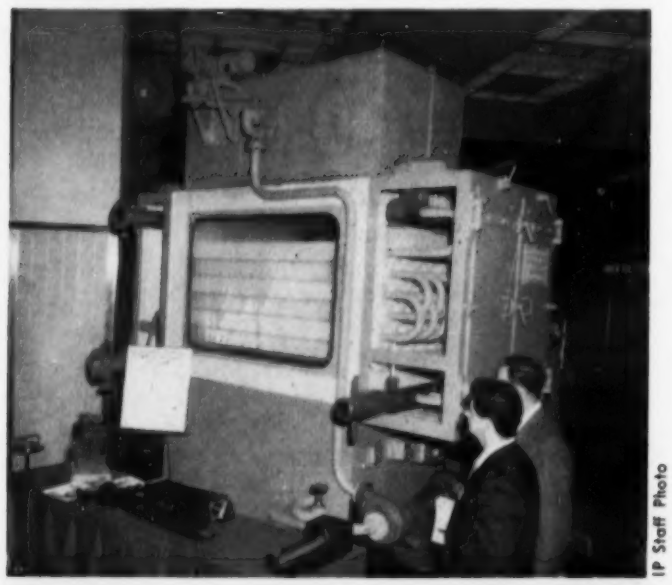
Fully compensated remote liquid level indicator automatically corrects for water density at all operating pressures. Indicator may be mounted above or below

IP Staff Photo

tank level and on stationary or marine boilers. Visual and audible electric alarm signals can be connected easily to control unit. Models are available for boiler pressures up to 2500 psig with ±3% accuracy. YARNALL-WARING COMPANY.

701-Water wash economizer while on load

Water wash your economizer while in operation to prevent damage from impurities in lower grade fuels. On-load washing removes sulfuric acid at safe, elevated


IP Staff Photo

temperatures. It removes vanadium and other catalysts, and other harmful deposits while maintaining peak economizer heat transfer rate. Washing operation requires from 10 to 30 minutes and is seldom carried out more than once a week. Equipment enables large boilers to stay on line for extended periods. Water washing results in higher efficiencies using lower grade fuels. GREEN'S ECONOMISER LIMITED.

702-Air cylinder operates knife switch

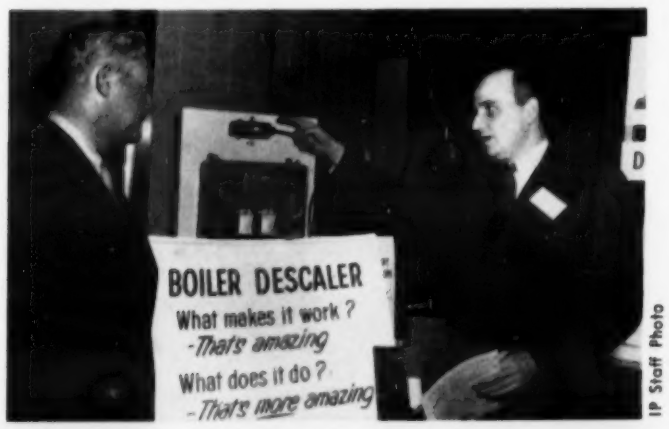
Complete, ready-to-operate unit contains three-blade 600-volt knife switch with air cylinder actuator. Available in capacities from 200 to 2000 amperes, unit permits

IP Staff Photo

safe, positive remote knife switch operation. Can be used in conjunction with auxiliary circuits to show open or closed switch position. BARKELEW ELECTRIC MFG. CO.

703-Ultrasonic unit descales boilers

Unique ultrasonic generator dislodges scale and prevents its reformation. High-frequency vibrations break up scale into small particles that are easily removed. Unit eliminates costly chemicals, softening plants, daily



IP Staff Photo

water testing, and staff training. Up to four transducer heads can be supplied by one ultrasonic generator. Generator can be 150 feet away from transducer. SORENSON & COMPANY, INC.

704-Control panel can be built in

Factory-built, package control panel can be built into boiler front. Sloping gages are easy to read. Wide-opening doors give ready access to all control instrumentation.

IP Staff Photo

Used with type D boilers, insulation is provided for panel by internal airflow across boiler front. New panel provides package controls for immediate, economical hookup to boiler. SUPERIOR COMBUSTION INDUSTRIES, INC.

705-Expansion joints last longer

Expansion joints for longer cyclic life, better equalization, and in sizes from 3 to 72 in. dia are now available. Joints are made in stainless, Monel, Inconel, and in other alloys for special applications. Improved design eliminates "compression stops" — prevents danger of trans-

IP Staff Photo

mitting expansion forces through pipe lines if overtraverse occurs. Design permits greater effective flexing height and produces even flexing under high pressures and temperatures. BADGER MANUFACTURING CO.

706-Color code your service lines

Protective color coating for indoor and outdoor insulation is now available in seven colors plus black and white. Clear, fresh water is used as thinner. When dry, a strong,

IP Staff Photo

odorless, fire-retardant, weather-and fume-resistant protective film remains. Coating can be used within temperature limits of –50 and 180 F. Can be applied by brush, spray, or roller. BENJAMIN FOSTER COMPANY.

707-Pump solids in suspension easily

Volume of sewage and other suspended solids is accurately controlled through pump internal bypass arrangement. Manual or automatic control of entrance cylinder varies clearance between revolving impeller blades and cylinder. This results in controlled flow from pump discharge. Heavy-duty construction and rigid

IP Staff Photo

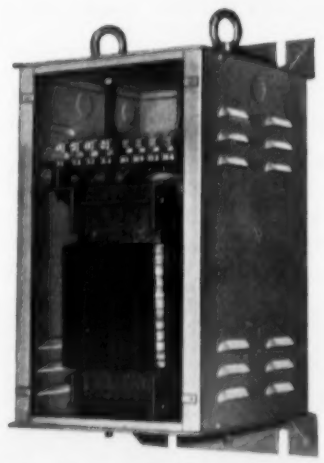
alignment assures maximum life for all parts. Features wide range of capacities and heads, lower power requirements. ALLIS-CHALMERS MANUFACTURING CO.

(more new products on page 30)

SORGEL dry-type transformers are *really different!*

They are not just ordinary transformers

15 to 50 Kva 3-phase. Wall mounting. Connection compartment panel removed



20 to 75 Kva single phase. Wall mounting. Connection compartment panel removed

SORGEL TRANSFORMERS

Compare and check these features:

QUIET OPERATION — The sound level of SORGEL dry-type transformers is well below the established standards. Therefore they are adaptable for any indoor installations, including those structures where sound levels are an important factor.

HIGH EFFICIENCY — SORGEL dry-type transformers are designed to carry the full rated load at high efficiency.

SAFE TEMPERATURE — SORGEL dry-type transformers have a safe operating temperature.

EASY INSTALLATION — Wall brackets or floor mounting bases are an integral part of SORGEL dry-type transformers. All are equipped with solderless terminal lugs. Terminal board for the larger ratings.

UNDERWRITERS' APPROVED in all the ratings covered by the Re-examination Service, both single phase and 3-phase. They also meet or exceed the requirements of ASA, AIEE, and NEMA standards.

LONG LIFE — Thermo-vacuum impregnated windings brazed to solderless terminals assure years of trouble-free service.

Available in all standard and intermediate ratings and voltages — ¼ to 3000 Kva up to 15000 volts.

SUBSTATIONS—SORGEL transformers, either dry-type or Askarel-cooled, are incorporated in substations, complete with primary or secondary switchgear. They are procurable with any make of switchgear, and from any substation manufacturer.

SORGEL ELECTRIC CO. 841 WEST NATIONAL AVE., MILWAUKEE 4, WIS.

Sales Engineers in Principal Cities

Circle 107 on READ-N-CIRCLE card for more data

new products

. . . starts on page 28

708-Remove copper in single stage

Single-stage, acid-fill cleaning job removes copper from boiler simultaneously with usual water-formed deposits. Copper removal is made possible by using copper-complexing agents that put metallic copper into solution

IP Staff Photo

and complex copper ions so that they remain in solution. Field tests in both utility and industrial boilers show efficiency of this new process. DOWELL INCORPORATED.

709-Get rapid, economical reproduction

New, compact reproduction machines in all sizes to meet your requirements are now available. Units use direct-copying process to reproduce sharp, black-on-

IP Staff Photo

white facsimiles that are exact copies of drawn, written, typed, or printed matter. Process is clean, simple, and odorless. Desk-top machine is available with 11-inch printing width. Makes up to 300 letter-size copies for less than 1.5¢ each. Plug-in units require no exhaust venting, plumbing, or special installation. CHARLES BRUNING COMPANY, INC.

710-Pipe supports occupy ¼ space

New pipe supports, using Belleville washer principle, carry identical load as conventional types while occupying less than ¼ the space. Belleville washers occupy

IP Staff Photo

space between bearing discs. New line now covers from 50 to 70 sizes. More complete line will be available by next year. BERGEN PIPE SUPPORT COMPANY.

711-Steam trap has one moving part

Thermodynamic steam trap can be used for pressure ranges from 10 to 600 psig without seat or valve changes, or other adjustments. Trap consists of three parts. Only moving part is hardened solid stainless steel disc. Operates against back pressures up to 50% of inlet pressure.

IP Staff Photo

Small, versatile steam trap is practically maintenance free and gives years of trouble-free service. SARCO COMPANY, INC.

712-Catch elusive microscopic dust

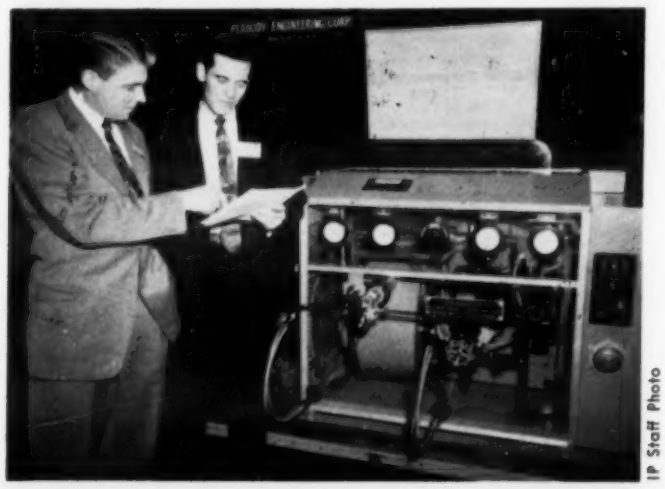
Hydro Precipitator Scrubber removes microscopic solids, fumes, and odors. Unit is completely self-contained and is built specifically to maintain high efficiency

IP Staff Photo

dust collection down to submicron size particles. Units are available with capacities from 500 to 40,000 cfm. High-temperature operation, low maintenance, and low water consumption are features of these units. THE JOHNSON-MARCH CORPORATION.

713-Burn oil or gas automatically

Fully integrated oil, gas, or combination oil-gas firing controls for automatic operation are now available. Units feature flame failure protection, interlock safety circuit, prepurge, and postpurge. Burners are built with oil capacities between 500 and 3000 lb/hr and equivalent in gas. Each unit includes burner and blower as well as en-



IP Staff Photo

tire combustion system. Units have a wide range of steam atomizing or mechanical atomizing control. PEABODY ENGINEERING CORPORATION.

714-Canned pumps are pint-sized

Canned pumps are now available in power ranges from 1/3 to 7½ hp. Pumps feature built-in circulating system, built-in motor thermal overload protection, and quick disassembly. Complete teardown is possible in slightly

IP Staff Photo

over two minutes without removing impeller case from discharge or suction connections. Only seven parts comprise the pump and motor combination. Combined rotor-impeller is the only moving part. NUCLEAR PUMP INC.

MORE INFORMATION

For detailed free information on these products just circle the key numbers on the READ-N-CIRCLE card on page 47 or 48.

715-Erect walls quickly

Panel wall construction with metal framework permits easy attachment of piping, conduit, brackets, shelves, control panels, and equipment. Metal framework has continuous bolting slot exposed on both sides of wall. A special nut can be inserted into this slot permitting

IP Staff Photo

attachment directly to wall without damage or drilling. VERSABAR CORPORATION.

(more new products on page 32)

Unretouched photo showing typical return line corrosive action resulting from carbonic acid and dissolved oxygen in condensate.

BREAKING DOWN WITHIN

This section of pipe looks like new—on the outside. But take a look inside. Grooving action caused by carbonic acid and deep pitting, the result of dissolved oxygen attack, have almost completely penetrated the pipe wall.

Dearborn FILMEEN* prevents such destruction. FILMEEN forms a protective, non-wettable barrier between treated steam, or condensate, and metal pipe surfaces. By preventing the carbonic acid and dissolved oxygen from coming into contact with the metal, FILMEEN assures corrosion-free lines. FILMEEN is only one of many Dearborn water conditioning products scientifically developed to control specific corrosion problems. Others eliminate scale, sludge, carry-over and similar difficulties.

Power engineers in leading industrial and commercial plants place their confidence in Dearborn's 70 years of experience in water chemistry. They have found the answer to the demand for complete plant protection in Dearborn Supervisory Service—a properly balanced water conditioning program which combines quality products with correct, technically supervised control methods and test procedures.

Let a Dearborn Engineer survey your plant and recommend the type of water control program best suited to your requirements.

**FILMEEN is the trade-mark of a corrosion-inhibiting compound patented and produced exclusively by Dearborn Chemical Company. U.S. Pat. No. RE 23614.*

Dearborn®

...a leader in water conditioning and corrosion control for 70 years

Dearborn Chemical Company
Merchandise Mart Plaza, Dept. INP, Chicago 54, Ill.

Gentlemen: ☐ Have a Dearborn Water Conditioning Engineer call.
☐ Send me complete information on Dearborn Water Conditioning Program.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*.....*State*.....

Circle 137 on READ-N-CIRCLE card for more data

ELECTRICAL CIRCUITS

Direct and Alternating Currents

By CHARLES S. SISKIND

Assistant Professor of Electrical Engineering, Purdue University

502 pages, 6 x 9, 261 illustrations, $6.75

This book provides you with a single introductory course on the fundamental principles of electric and magnetic circuits. Covering both d-c and a-c circuits, it is designed especially to prepare you for advanced studies in machinery, power distribution systems, electronic circuits, control equipment, and other electrical devices. The book will give you a solid foundation of circuit principles that is both rigorous and consistent with good engineering practice.

Gives you the clear explanations you need on:

—Determination of average current
—Insulation in high-voltage cables
—Unequal resistors in parallel
—Sources of supply in series or parallel
—Kirchhoff's laws
—Thevenin's theorem
—Vector properties of magnetic fields
—Flux distribution around parallel conductors
—The unsymmetrical-type electromagnet
—Leakage flux
—Fringing of flux in an air gap
—Hysteresis
—Direct-current ammeters and voltmeters
—Multirange instruments
—The Varley loop
—Current growth in inductive circuits
—Magnetic-field energy
—Magnetically coupled coils connected in series
—Charging a capacitor
—Multiple-dielectric capacitors
—Generation of alternating emfs
—The alternating current ampere
—Relations in basic parallel circuits
—Vectors expressed in polar notation
—Equivalent T-network of coupled circuits
—The concentric-vane instrument
—The radial-vane instrument
—Vector notation in polyphase circuits
—Power in three-phase balanced systems
—Unbalanced delta-connected loads
—Graphical analysis of nonsinusoidal waves

Order your copy from

Industry Power

new products

. . . starts on page 28

716-Simple, positive flow indicator

Flow velocity, striking chromium plated disc, rotates ring to give positive flow indication. Glass enclosure provides high visibility for spinning ring. Indicators

IP Staff Photo

are available in ranges from 0.72 to 120 gpm and at operating pressures to 50 psig. Units are available for pipe sizes from ½ to 3 inch. McINTOSH EQUIPMENT CORP.

717-Oil heater and burner work as pair

Complete, pre-assembled fuel oil heaters and burners pair up to give economic, trouble-free operation. Oil preheaters are available to use both steam and electric power. Units range in capacity from 115 to 1200 gph.

IP Staff Photo

Combination oil-gas burners instantly change from one fuel to the other. Can be used with light or heavy fuel oils and with natural, mixed, or LP gas. Complete line of extra equipment for both oil and gas firing is available. PREFERRED UTILITIES MANUFACTURING CORP.

718-Transmit steam flow linearly

High-pressure, high-velocity steam flow may be measured and transmitted pneumatically on a linear flow basis. Transmitter automatically converts differential pressure to rate of flow. Transmitters measure steam

IP Staff Photo

flow producing differentials from 100 to 1200 in. wg at maximum service pressures of 800, 3500, and 6000 psig. Transmitter extracts the square root of flow differential measurements to produce pneumatic signal proportional to rate of flow. Incorporates accuracy of mercury U-tube measurements for improved metering and control practices. BAILEY METER COMPANY.

719-Hot water generator saves piping

New hot water generator achieves 80F temperature differential between influent and effluent water. This permits high heating efficiency with smaller pipe sizes.

IP Staff Photo

Built-in counterflow economizer raises return water temperature close to saturated temperature with flue-gas heat before water reaches radiant water-wall section. This eliminates possible thermal shock. High-velocity circulation assures instant response to automatic controls and provides close temperature control. Units are available in capacities from 1 million to 10 million Btu/hr with 500 F maximum water temperature. INTERNATIONAL BOILER WORKS COMPANY.

measured quantities of heat quickly • accurately to 750° F

CHROMALOX Electric CIRCULATION HEATERS

Used for preheating oil—heating water—generating, superheating and drying steam—heating process kettles and tanks—heating Dowtherm, Arocior, Prestone and similar heat transfer liquids —heating air, nitrogen and other gases.

Easy to install, operate and maintain, these compact, packaged heating units are automatic and self-contained—with built-in heating elements, heating chamber, thermostat, and insulation. Provide dependable round-the-clock operation. Ideal for converting steam or gas-heated equipment to automatic electric operation.

Let the Chromalox Sales-Engineering staff solve your heating problems . . . electrically.

Write today for your copy of Bulletin 701

. . to get complete information on Chromalox electric heat exchangers and their applications.

For information on complete line of Chromalox electric heaters and controls—request Catalog 50.

Edwin L. Wiegand Company

7520 Thomas Boulevard, Pittsburgh 8, Pennsylvania

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☐ a copy of Bulletin 701.
☐ a copy of Catalog 50.
☐ a Sales-Engineer contact me.

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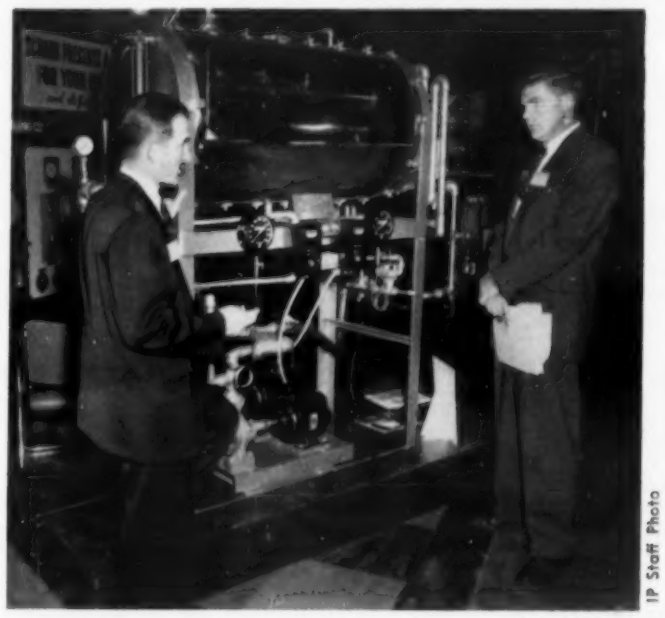
Company_____
Street_____
City_____ Zone_____ State_____

A-4470 A

Circle 110 on READ-N-CIRCLE card

720-Deaerators fit your budget

Simple, safe, economical deaeration — with oxygen removal down to 0.03 cc/l — can be obtained with units available for boiler steam capacities from 1000 to 30,000 lb/hr. They operate at steam pressures as low as 7 psi



IP Staff Photo

and as high as 250 psi. Deaerator operates fully vented at atmospheric pressure. Unit accessories and controls include combination temperature-pressure regulator, makeup control valves, corrosion inhibitor, boiler feed pumps and water level control. Other units are available that provide oxygen removal to 0.005 cc/l. FRED H. SCHAUB ENGINEERING COMPANY.

721-Welded grating for greater strength

New grating design and construction using I-beam sections and projection welding results in strong, rugged grating. New design features less weight, more load car-

IP Staff Photo

rying capacity, and greater rigidity to distributed and concentrated loads than was possible with conventional gratings. New design places most material where stress is greatest. THE GLOBE COMPANY. ♦ ♦

ELIMINATE ERRORS in BATCH MIXING

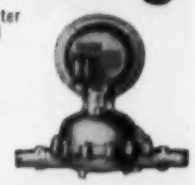
with

NIAGARA *Automatic Displacement Meters!*

SET FOR 175 gallons—GET 175 gallons

Uniformity of a liquid product depends on accurate measurement of all ingredients from batch to batch. You can be sure of consistent accuracy by equipping with Niagara Electri-contact Meters. A precision electric Switch closes or opens an electric circuit after the passage of a predetermined quantity of liquid through the meter. Can also be used to generate electrical impulses to actuate other control mechanisms . . . shut off a pump motor . . . signal visually or audibly to the operator. Brings automation to liquid control and measurement in hazardous or non-hazardous atmospheres.

Chemical Meter with inclined register.



Rear View, Explosion Proof Meter.

Begin now to lower your liquid measuring costs and have the assurance of positive accuracy. Mail coupon for complete information.

BUFFALO METER CO.
2933 MAIN STREET
BUFFALO 14, NEW YORK

Please send me complete information on the use of economical NIAGARA METERS, based on the data below:

Liquid..... Pressure.....p.s.i.
Temp.....°F.
Flow rate.....g.p.m.
Maximum batch.....gals.
Name.....
Company.....
Address.....

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basic bulletins

. . . just circle key numbers on READ-N-CIRCLE card on pages 47 or 48

AIR CONDITIONING, HEATING, VENTILATING

500-Propeller fan data

Revised specifications, performance data, and dimension drawings on entire line of propeller fans are contained in Bulletin A-109B. Includes latest data on reversible, low-noise, and utility fans, with description of heating and cooling units. Includes charts listing performance of each unit with installation diagrams showing proper piping and control location. Forty pages. HARTZELL PROPELLER FAN CO.

BOILERS AND BOILER ACCESSORIES

502-Package boiler tables

Bulletin PSG-2 contains tables of capacities, dimensions, and weights of nine typical package boilers. Includes illustrations of firing and control equipment plus recommendations for installation for three pressure-classes available. Ten pages. HENRY VOGT MACHINE CO.

504-Blowdown control chart

Determination of rate of boiler blowdown and selection of a correctly sized heat exchanger are made possible with use of simplified Chart JPC, based on total dissolved solids in boiler water. Also given are recommendations for selection of blowdown equipment in accordance with normal operating conditions of boiler installation. HENSZEY CO.

505-Boiler setting and baffle data

More than 30 boiler-setting plans are shown, with an analysis of how each arrangement of tubes is baffled to meet the specific boiler design, in 20-page Bulletin BW-54. THE ENGINEER CO.

COMPRESSED AIR SUPPLY

507-Get cooler, drier air

How aftercoolers remove moisture from compressed air and gas is explained in Bulletin 130. Schematic flow diagrams show how aftercoolers can cool and dry compressed air systems in any plant. Eight pages. NIAGARA BLOWER COMPANY.

ELECTRIC DISTRIBUTION

510-Panelboard engineering data

Engineering data for panelboard selection and installation are contained in Bulletin 3-205. Illustrations, engineering drawings, and specifications describe the features and construction of each panelboard and give recommendations for application. Includes data on Underwriters' Laboratory transformer connection requirements, and circuit breaker characteristics. Seventy-five pages. FEDERAL PACIFIC ELECTRIC COMPANY.

512-Lowdown on dry transformers

Applications, sizes, types, and construction of air-cooled dry-type transformers is described in Bulletin 155. Specifications are included. Special custom-built transformers and reactors are discussed. Eight pages. SORGEL ELECTRIC COMPANY.

513-New variable transformer ratings

Types 136 and 236 Powerstat variable transformers—design, new ratings, and performance—are discussed in eight-page Bulletin P354. THE SUPERIOR ELECTRIC CO.

ELECTRIC UTILIZATION

514-Selenium rectifier handbook

Bulletin GEA-6545 gives features, uses, charts, construction details, dimensions, and specifications for selenium rectifiers. Data covers rectifiers from ¾ kw to 125 kw, plus multiples to 500 kw. Twelve pages. GENERAL ELECTRIC CO.

HEAT EXCHANGERS

515-Selecting heat exchanger tubing?

Engineering data, specifications, and application recommendations for condenser and heat exchanger tubing, plates tube sheets, and baffles are contained in Bulletin B-2. Separate section discusses corrosion factors in condenser tube service. Includes tables giving weights in lb/linear ft, theoretical carrying capacity, physical properties, and tensile strength. Forty-four pages. THE AMERICAN BRASS COMPANY.

INSTRUMENTS AND CONTROLS

516-Measure your feedwater gas

Folder 148BP describes an analyzer for measuring dissolved oxygen and hydrogen in feedwater. Advantages, ranges and accuracy are discussed. Four pages. CAMBRIDGE INSTRUMENT CO., INC.

519-Pneumatic systems handbook

Complete discussion of all phases of pneumatic control is contained in Bulletin 1120. Separate sections are devoted to transmission of pneumatic signals, cascade and ratio control, time replay, interconnected control systems, and tuning controllers to your needs. Charts, sectional diagrams, and typical installations are included. Forty-six pages. MINNEAPOLIS-HONEYWELL REGULATOR CO., BROWN INSTRUMENT DIVISION.

520-How to select liquid-level control

Bulletin-1 discusses the factors to be considered in selecting a liquid-level control. Includes controls in types and sizes for handling practically any liquid, at any pressure and any temperature. Eight pages. MAGNETROL, INC.

521-All-purpose meters for fluid measurement

Principles of operation of nutating-piston-type meters are explained in Bulletin 37. Contains illustrations and

Circle 105 on READ-N-CIRCLE card for more data

BASIC BULLETINS SUBJECT INDEX

Air conditioning, heating, ventilating 34
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Mechanical power transmission 36
Pumping equipment 36
Refractories and insulation 36
Traps, strainers, and separators 36
Valves and regulators 37
Water supply and treatment ... 37

data of typical installations, trap strainers, air release valves, high-pressure meters, and meter registers for fluids measurement. Twenty pages. BUFFALO METER CO.

LIGHTING

522-Fluorescent lamp ballast data

Bulletin GEC-983H contains new data on the complete line of weatherproof fluorescent lamp ballasts. Also lists wiring diagrams and electrical specifications for ballasts. Cover ballasts for general line fluorescents, outdoor applications, rapid-start and circline lamps. Includes schematic wiring diagrams for proper installation of ballasts. Twelve pages. GENERAL ELECTRIC COMPANY.

MAINTENANCE ITEMS

524-Manual on tool steels

Fourth edition of "Tool Steel Handbook" contains latest data on tool steels including types, properties, uses, and problems of working tools and high-speed steels. Includes handy reference tables. 204 pages. ALLEGHENY LUDLUM STEEL CORP.

525-Bearing engineering manual

Complete data on Oilite bearings is contained in Bulletin E-56. Lists Brinell and Rockwell ratings with industrial applications for all materials. Describes over 1000 standard sleeve, flange, and thrust bearings. Fifty-two pages. AMPLEX DIVISION, CHRYSLER CORPORATION.

527-Complete tube expander manual

Detailed information on tube expanders, tube rollers, and associated tools is contained in Catalog 88. Lists many new tools and tells how each is used. Illustrations show tools for maintenance of boilers, condensers, and evaporators. 119 pages. THOMAS C. WILSON, INC.

MATERIALS HANDLING (BULK)

529-How to store bulk materials

Storage bins for bulk materials such as ashes, coal, coke, sand or lime are discussed in this bulletin. Contains tables of densities of flowable materials, capacities, description of wall construction, test data, and other relevant engineering data with many photographs. Twenty-nine pages. THE NEFF & FRY CO.

(more basic bulletins on page 36)

another reader service . . . .

the LOCATOR

Turn to page 53 and you'll find a complete listing of all advertisers and the local offices they have ready to serve you. Information in a hurry is yours with INDUSTRY POWER'S LOCATOR . . . .

see page 53

Write your own specifications:

VOLATILITY
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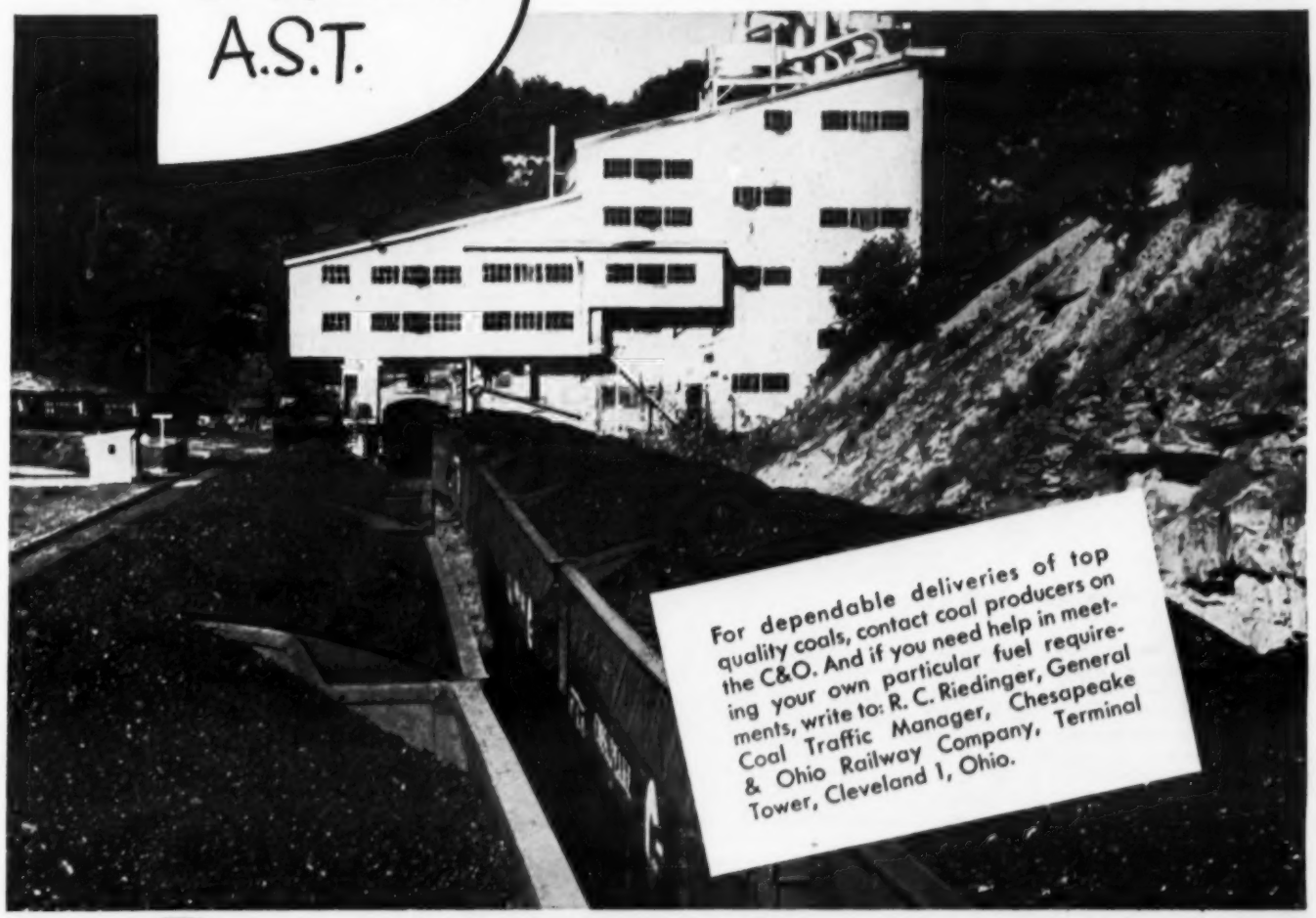
SIZE
ASH
MOISTURE
SULPHUR
A.S.T.

. . . the modern, efficient mines on the C&O can produce just what you want.


For dependable deliveries of top quality coals, contact coal producers on the C&O. And if you need help in meeting your own particular fuel requirements, write to: R. C. Riedinger, General Coal Traffic Manager, Chesapeake & Ohio Railway Company, Terminal Tower, Cleveland 1, Ohio.

Chesapeake and Ohio Railway

WORLD'S LARGEST CARRIER OF BITUMINOUS COAL

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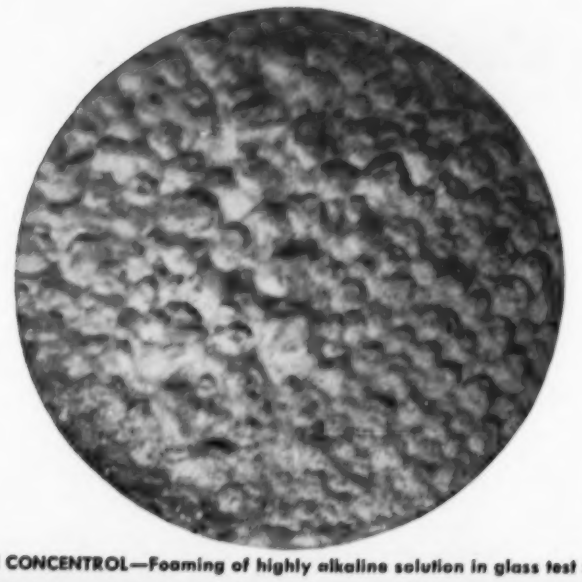
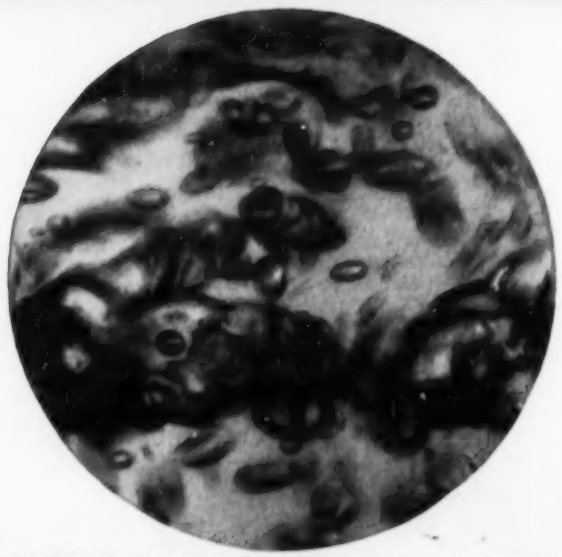


BEFORE CONCENTROL—Foaming of highly alkaline solution in glass test cylinder.

HERE'S PROOF:

CONCENTROL

CONTROLS FOAM AND BOILER WATER CARRY-OVER



AFTER CONCENTROL—Same solution after addition of 12 ppm of Concentrol Antifoam.

Where boiler water carry-over is caused by foaming due to high alkalinity and high proportion of dissolved solids in the water, Concentrol provides a low cost, effective method of chemical treatment and control. Supplied in liquid, powder or briquet form—to be fed continuously or in slugs to boilers—Concentrol is essentially a surface agent that causes breakdown of bubble film to prevent foam formation. Formulations of Concentrol can include organic sludge conditioning agents and other water treatment chemicals for boiler treatment as well as antifoam. Fast acting and resistant to hydrolysis or breakdown under normal boiler temperatures and pressures. Eliminates need for costly pre-treatment of water and high blow-down rate.

Write for NAME OF BIRD-ARCHER WATER TREATMENT ENGINEER NEAREST YOU.

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LABORATORIES ENGINEERS · CHEMISTS

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WATER TREATING ENGINEERS

THE BIRD-ARCHER COMPANY, 4337 N. AMERICAN ST., PHILADELPHIA 40, PA.

New York, Chicago

The Bird-Archer Co. of California, 881 Mission St., San Francisco

Offices also in Canada and Mexico

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basic bulletins

. . . starts on page 34

MECHANICAL POWER TRANSMISSION

531-Quick selection charts for V-belts

Quick, easy selection of V-belt drives is now possible with Bulletin 20P50. Provides selection tables for A, B, C, and D section variable-speed drives. Lists horsepower rating tables for all belt sections, gives design features and drive principles. Lists formulas for calculating correct V-belt for your installation. Includes accessories such as sliding motor bases and adjustable sheaves with from 1 to 12 grooves. Forty-four pages. ALLIS-CHALMERS MANUFACTURING COMPANY.

PUMPING EQUIPMENT

532-Handbook of hydraulic tables

This comprehensive reference work is now available for engineers interested in pumping and piping problems. Bulletin 50 also contains data useful to all engineers. Twenty-eight pages. THE ALDRICH PUMP COMPANY.

533-General-purpose pump manual

Specific engineering data on more than 50 pumps are given in Form 7223-B. Describes pumps with capacities from 5 to 2800 gpm, with pressures from 10 to 525 feet total head. Cutaway view shows salient design features. Includes performance data on all pump types (including self-priming, end and side suctions) with electric, diesel, or gasoline-engine drives. Twenty pages. INGERSOLL-RAND CO.

REFRACTORIES AND INSULATION

535-Insulation, refractory handbook

Engineering data, formulas for calculating heat transmission, tables on heat losses from bare surfaces, and equivalent thicknesses of pipes are a part of the technical information contained in Bulletin IP-36A. Fifty-two pages. JOHNS-MANVILLE.

536-Centrifugal refrigeration engineering data

Basic engineering data on new hermetic centrifugal refrigerating machine is presented in Catalog 19C-100. Compact, lightweight centrifugal cooling unit features pushbutton operation and low installation costs. Units are available from 90- to 350-ton models. Includes easy-to-read tables for selecting best combination of compressor, cooler, and condenser. Gives schematic electric control diagram for ease in planning wiring. Twenty pages. CARRIER CORPORATION.

TRAPS, STRAINERS, AND SEPARATORS

538-Steam trap manual

Real low-down on steam trap operation is contained in "Armstrong Steam Trap Book." Includes many illustrations of correct steam trap installations. Cutaway sections show steam trap operating principles. Lists steam traps for all sizes from ½ to 2 inch. Includes data on how to trap unit heaters, submerged steam coils and tubes, siphon drains, and low pressure heating systems.

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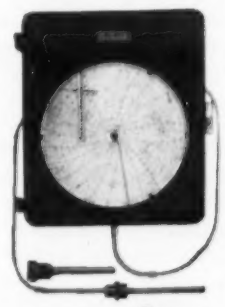

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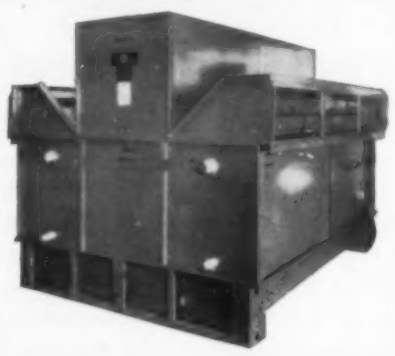

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540-Data for full line of valves

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541-Control valve reference book

Three basic types of single-seated diaphragm control valves are discussed in 15-page Bulletin 5304. Cutaway views and charts with complete specification data make this a good reference book. LESLIE CO.

542-Why not a solenoid valve?

If you use direct operated solenoid valves for automatic or remote flow control of liquids and steam up to 400 F or of high viscosity liquids, you will want to read Bulletin V-2. Normally closed, normally open, explosion-proof normally closed, and three way valves are shown. Eleven pages. THE JOHNSON CORP.

WATER SUPPLY AND TREATMENT

544-Boiler cleaning case histories

Read how 25 power plant operators obtained excellent results in removing scale and rust in their water systems. Kwik-Kleen is noncorrosive—does not attack metals, valves, gaskets, packings, or paint. Permits complete, rapid removal of scale and rust—does not create undesirable odors or toxic fumes. Case histories give details of how savings up to 67 percent have been realized. Twelve pages. NORTH AMERICAN MOGUL PRODUCTS COMPANY.

545-How to supply your own water

Methods of abstracting water from the ground or by infiltration through permeable beds of rivers or other bodies of water are discussed in 20-page bulletin. Performance charts for this company's collector are supplemented with cross-sectional drawings and cutaways. RANNEY METHOD WATER SUPPLIES, INC.

547-Simplify water treatment

Information to accurately select water treating equipment for any plant, industry, or other institution is contained in this bulletin. Three basic exchange materials are described. Includes water and brine distribution mechanism and exchange material depth. Sketches show direction of water and brine flow during service, brine-rise, and regeneration cycle. Contains specifications including flow rates, exchange capacities, amount of salt, and shipping weight. Eight pages. ILLINOIS WATER TREATMENT COMPANY.

548-Water treatment equipment manual

Precipitation and adsorption method of feedwater treatment used in Accelerator and Hot-Flow softeners is described in Bulletin NICSI-A. Covers chemistry of hot process treatment. Compares results of various treatments. Lists equipment and accessories available. Twenty pages. INFILCO INC. ♦ ♦

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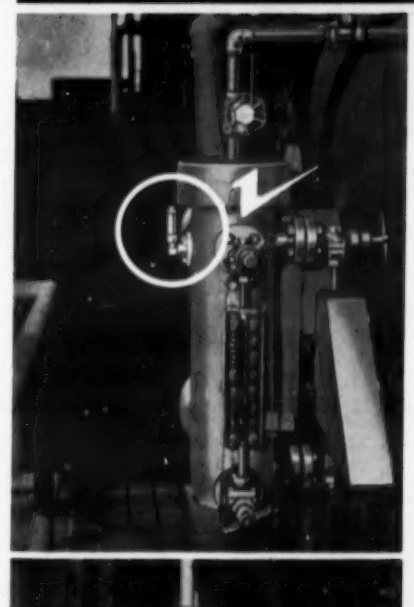

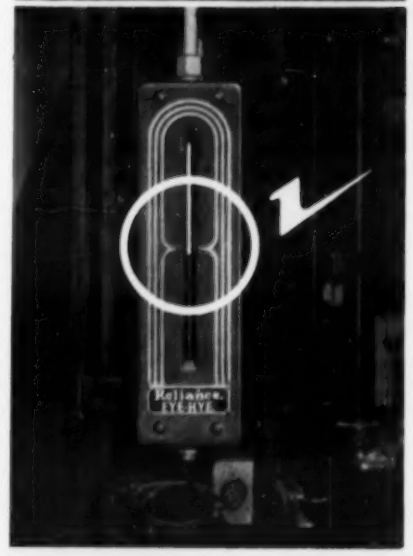

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Motor trends

. . . starts on page 20

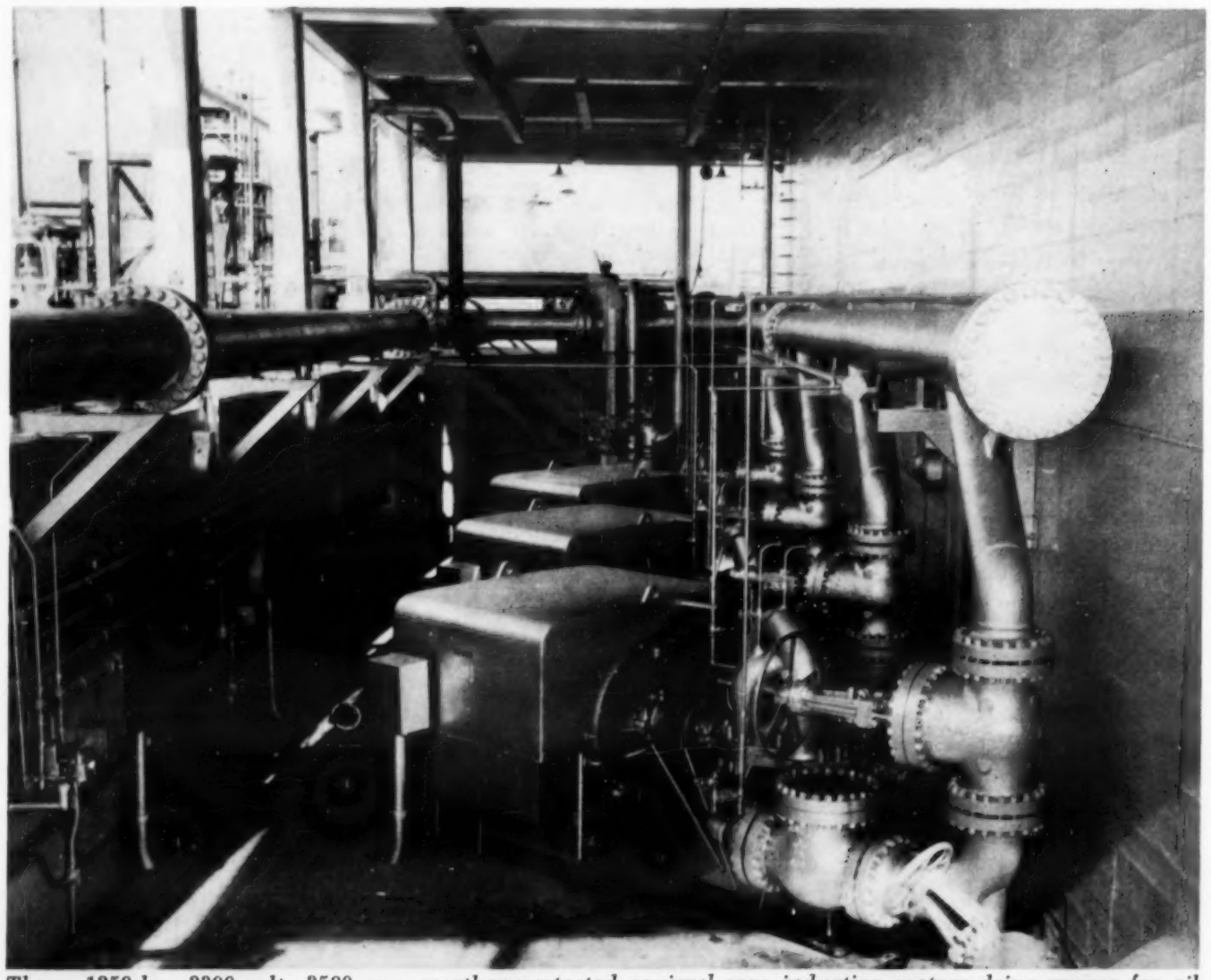
mon in the larger machine sizes. Neutral line current transformers are mounted on the motor and leads run to control protection against unbalanced currents caused by single-phasing, grounding, and faults within the machine itself.

Protection against excessive heating from overloading or high ambient temperatures is provided simply with slot-located stator resistance temperature detectors and thermocouples, or with bimetallic temperature-operated discs on coil ends or on coil iron. Frequently, motor temperature protection becomes part of a plant or station monitoring system where readings are recorded and warnings are issued. If temperature rises to a danger point, the motor automatically shuts down.

Protection against excessive bearing heat is often placed in the temperature monitoring system, with temperature sensing devices in bearings. Bearing temperature monitor circuit operates devices that warn operators to take immediate measures to prevent bearing failure.

Surge protection, consisting of capacitors and lightning arrestors, is common on large motors and is mounted directly on the motor yoke. Other protective equipment now in common use includes moisture detectors and water flow indicators for water-cooled machines, space heaters in all enclosed machines, air filters on air intakes where installation is made in dirty atmospheres or outdoors subject to dust and sand storms, and air-pressure drop indicators to measure pressure drop across filters. Anti-plugging switches on multispeed motors to prevent switching at the wrong speed, uncoupling devices, overspeed switches, plus oil flow and oil-pressure switches are devices protecting motor equipment.

Protection is carried in other directions, also. Motors are being used today where they were not used before. Expansion of utility, petroleum, gas, and chemical industries (as well as the greater reliability



Three 1250-hp, 2300-volt, 3580-rpm weather-protected squirrel-cage induction motors drive pumps for oil well water-flooding operations. Semioutdoor installations, such as this, reduce initial building costs.

of electric power systems and motors themselves) has resulted in development and use of large weather-protected, totally enclosed, fan-cooled, explosion-proof motors. Due to steadily rising building costs, plants in more temperate climates are using outdoor construction, which means that equipment is exposed to the weather.

Smaller motors located outdoors are usually totally enclosed fan-cooled types. Large motors, particularly in temperate climates, are using weather-protected construction. This construction has had wide acceptance and successful application. It is no longer necessary to build a house around a motor just because it must be outdoors.

Oil, gas, and product pipelines also are using outdoor motors to advantage. Large (1000-hp and larger) explosion-proof motors are gaining prominence. It is no longer necessary to build expensive fire walls between pump or compressor and motor. It is no longer necessary to struggle along with old diesel or gas engines because electric power is not available or reliable.

In oil refineries, explosion-proof motors are replacing steam turbines for compressor drives. Large compressors of 2000 to 3000 hp are using inert-gas-cooled induction squirrel-cage motors.

Chemical industries are using the more modern, enclosed motors to combat corrosive atmospheres and to make motors last longer. Industry after industry can be polled to show similar trends with newer motor designs and maintenance programs.

more across-the-line starting

Because today's power systems are more extensive and better integrated, changes have been produced in basic motor application. In the past, wound-rotor motors have been used where high starting torque was necessary but where starting kva was limited. Squirrel-cage motors are used today and started on full voltage across the line, thus producing a more reliable drive at less cost. Many of the variable-speed functions of the wound-rotor induction motor are now accomplished by other means — such as using prerotation vanes for compressors or electric and hydraulic couplings. Wound-rotor motor reliability has been questioned in the past due to vulnerability of exposed secondary windings, slip-rings, and brushes. But this has been remedied by recently available totally enclosed fan-cooled construction in larger sizes, although it is costly. Wound-rotor reliability thus has been improved.

Magnetic clutches have declined in use. Where they were formerly applied (with large, low-speed synchronous motors driving grinding mills in mining and cement industries and flour mills) similar motors with high starting torques are now being applied and are started on full voltage. Present power systems can handle increased starting kva without much difficulty.

Insulation has enjoyed rapid evolution in recent years. The future appears to be anything but static. New materials are being developed and tested every day for coil insulation. Many new insulations are in current use. Synthetic coatings on wire are rather commonplace now. Polyethylene and polyester films are being used as coil insulation and doing a good job. Silicone varnish is serving well, but the all-silicone rubber insulating system recently developed further improves reliability of stator windings and accelerates the trend toward outdoor installations. These new insulations are also giving better heat protection — permitting greater overloads and installation in warmer ambient temperatures.

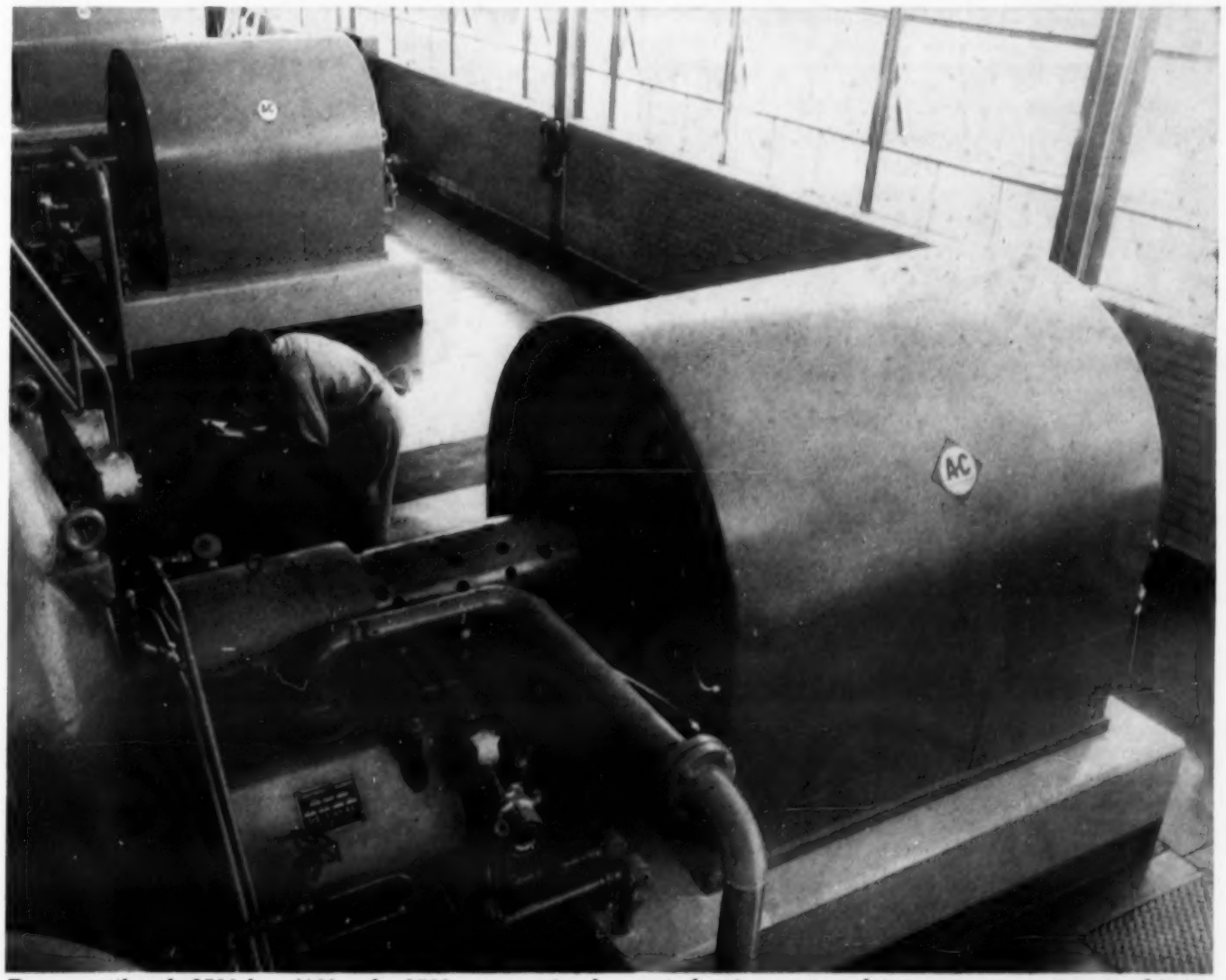
lower sound levels

Sound level of operating industrial machinery is becoming a much greater factor in plant location and equipment selection than ever before. Expensive measures are sometimes taken to reduce or eliminate noise. Motors are no exception and design engineers are becoming well-versed in noise treatment.

Motor sound levels are lowered by reducing or eliminating sound sources and absorbing remaining sound by use of baffles and sound-absorbing materials. Sound levels of large open-type high-speed motors have been reduced below that of the driven equipment. Usual irritating high-pitch frequency is gone. Completely enclosing a motor for forced-air ventilation, or water cooling with a heat exchanger, will eliminate objectionable noise. These treatments unless otherwise advantageous will usually prove to be economically unfeasible.

Noise (always an operating personnel problem and particularly so in indoor installations) is being reduced to minor proportions. Modern motors do not even resemble their older brothers. Steel fabrication permits fundamental changes that would have been too costly, if not impossible, with previous cast construction.

Future improvements will be closely related to new materials as they become available. As motor application requirements change, so will the motors themselves. ♦ ♦



Base-ventilated, 2500-hp, 4160-volt, 3580-rpm squirrel-cage induction motors drive gas compressors in this indoor pipeline pumping station. Reduced motor enclosure cost must be resolved with higher building costs.

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Who's your boss?

. . . starts on page 16

ity for meeting waste requirements. Industries inside a municipality, as a party to the Authority, are responsible for meeting requirements — both pretreatment and financial — which the muncipality will set. Pattern of these requirements within each municipality, however, is established by the Authority.

Construction was started on the Allegheny County Sanitary Authority project on February 20, 1956. This $100-million project is scheduled for completion in three years. Sixty-three miles of new sewer will get the area load to the treatment plant. Plant will have a daily capacity of 150 million gallons. This is a pioneering effort. Never before in history have so many individual municipalities and industries combined to provide common sewage treatment facilities.

state shoulders basic responsibilities

Basic responsibility for regulating stream pollution rests with state government. Originally this jurisdiction fell primarily within the activities of the State Department of Health. In recent years, however, there has been a trend toward centralizing all state pollution control responsibilities in a single control board or commission. Bearing out this trend, 19 of the 39 states with pollution control laws now have water pollution control boards.

Once a municipality begins to collect and discharge its sewage into a stream, it is responsible to the state for the sewage. Sewage must be handled so that it does not unreasonably pollute the stream. Municipality is responsible to the state for insuring that industrial wastes accepted will not create a serious pollution problem. If an industry discharging into the city system gets out of line, the state has authority to notify the city that it is discharging unsatisfactory wastes. The city, in turn, can take action against the industry. This points out that it behooves industries connected to a city system to live up to corporate citizenship responsibilities. Industries must take proper waste control action to have their waste loads meet city requirements.

industries responsible to state

Industries discharging directly into a stream without passing through a municipal system are responsible for meeting state requirements. Any industry planning to locate a new plant with direct stream discharge had best contact and receive counsel from appropriate state waste control agencies. In many cases, a higher degree of treatment is required for stream discharge than for wastes entering a municipal system.

Streams, and stream pollution, do not begin or end at state boundaries. There has been a trend in recent years toward creation of interstate pollution control agencies. These agencies coordinate and correlate a program for streams that border on or flow through a number of states. Such agencies also encourage each member state to adopt effective stream pollution control legislation. Plant engineers should deal with the state on pollution control requirements

Office for the Roanoke, Virginia municipal waste treatment plant is housed in this modern brick building.

even though an interstate agency may be concerned. These compacts have representatives from each state on their commissions. They do, however, deal primarily with pollution control agencies of the individual states rather than with industry's engineers.

Five interstate pollution control compacts are in effect at present. These compacts have been ratified by the legislatures of the member states and by Congress. The Interstate Sanitation Commission and the Interstate Commission on the Delaware River Basin were the first compacts ratified (1936).

Ohio River Valley Water Sanitation Commission (in effect in 1948) covers, by far, the greatest area of any interstate group. There are eight states signatory to this compact. It serves 17,100,294 people. This compact has been responsible for accelerating pollution control progress in the Ohio River Basin states.

Compacts still are being considered by other areas in the country. Another compact is nearing fruition in one of these areas — the Great Lakes Basin Compact for the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. This compact has now been ratified by five of the eight eligible states.

USPHS is federal arm

U. S. Public Health Service by legal mandate has been the federal agency concerned with water pollution control since June 30, 1948. At that time, Public Law 845 was passed by Congress giving the Service this responsibility. Before that time, the Service confined its stream pollution control work to research, survey activities, and assistance to states under its general public health charter.

Since Public Law 845 has been in effect, the Service has summarized basic information in the files of the states on various streams. The Service supplemented this information and issued comprehensive basin reports. Grants from the Federal government to the states for pollution control work have been administered within the framework of PL 845. The Public Health Service has made significant advances in training public health workers and in research. These are functions for which the Service is suited.

A signal development in water pollution control in recent years is completion of the Robert A. Taft Sanitary Engineering Center in Cincinnati. . . . the world's foremost sanitary engineering research center. At this center, work is being done on both water and air pollution control.

Public Law 845 gives the Federal government jurisdiction over pollution problems caused by municipalities or industries under certain specific conditions. When waste loads from one state create a problem in another state, the Surgeon General formally notifies the person or persons causing this problem. He also specifies a reasonable time to abate the pollution. The Surgeon General advises the state pollution control agency of his notification. He recommends that this agency take appropriate action. If the offender does not correct his problem after a reasonable period and the state agency has not taken action, the Federal Security Administration can call a public hearing. If no action results from the hearing, suit can be brought with concurrence of the state on behalf of the United States by the Attorney General.

Public Law 660 strengthens controls

On June 28, 1956 Congress passed Public Law 660 to extend and strengthen the water pollution control act. This act recognizes basic state responsibilities in pollution control. It also grants states the right to enter into compacts to regulate interstate pollution.

This new law recognizes research, investigation, training, and information. These are fields in which the U. S. Public Health Service can make a vital contribution. The act also grants $3 million annually to state and interstate agencies for establishing and maintaining pollution prevention and control measures. The act further authorizes $50 million annually for aid to municipalities, intermunicipal or interstate agencies for constructing treatment works.

In the new act, the Secretary of Health, Education, and Welfare and the Surgeon General have the same jurisdiction over individual industries and municipalities as under Public Law 845.

Federal government has research, training, and administration-of-grants responsibility in the interest of accelerating the nationwide pollution control program. Federal government is also responsible for coordinating and taking corrective action in interstate problems when necessary corrective action has not been taken by states or interstate agencies. ♦ ♦

Business decisions affect your tax return

LONG-RANGE tax planning in today's business world of high tax rates is no longer "big business foolishness." Last-minute tax worrying with no year-round tax thinking can result in sizeable losses for small and medium-sized businesses when income tax time comes around.

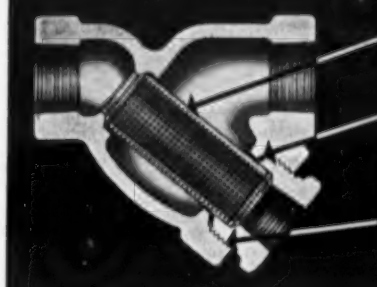
A general rule to consider when you are deciding whether it would be more advantageous taxwise to sell or trade-in an asset is: sell "loss" property to obtain a deduction, and trade "profit" property to avoid tax that must be paid on profit realized from sale of an asset.

You can save tax dollars by realizing that business decisions made in the fall affect the tax you must pay in the spring. Practice year-round tax thinking, and obtain professional advice about tax matters when you are in doubt as to the tax effect of your business decisions. ♦ ♦

NEED STRAINERS?

Take a look at this one!

Armstrong Y-type pipe strainers look much like other strainers on the outside, but the INSIDE is what counts! Look at these features:



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Leslie Floatless Level Control Pilots sense changes in liquid level that will help you maintain peak output. You save maintenance dollars, too — forget troublesome floats and cages (there aren't any).

With low resolution sensitivity (.1 of an inch change in level creates response), you are assured of smooth, throttling action and a closely held level.

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Send for Bulletin 5303 on Leslie Control Pilots

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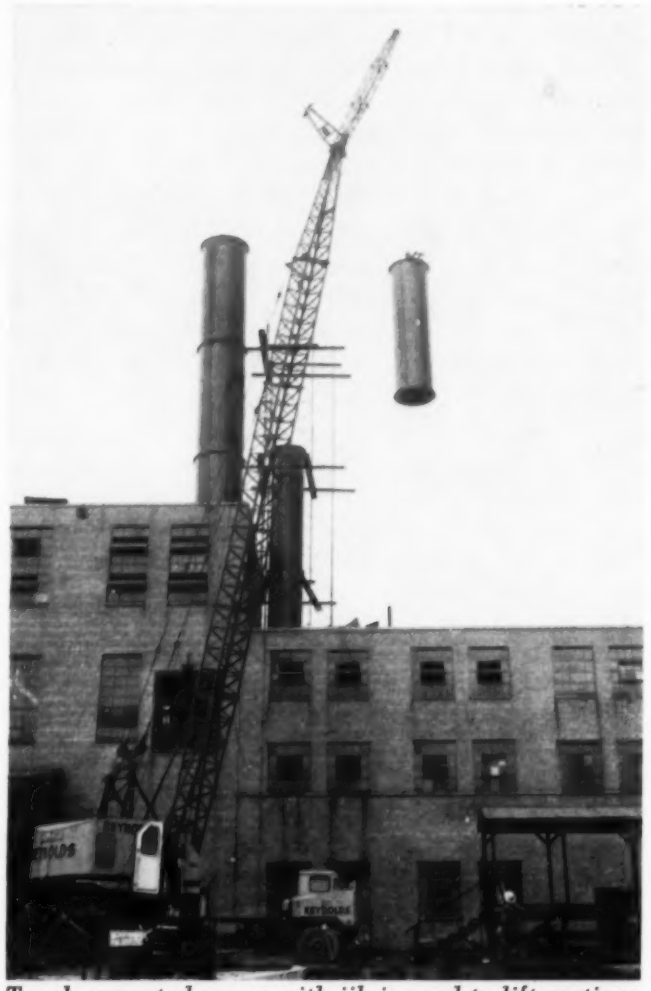


Truck-mounted crane with jib is used to lift sections into position. Man at lower right holds guide line.

and dump grate. This boiler is equipped with superheaters and economizers and is rated at 75,000 lb/hr steam. Flue gas temperature runs 330 to 360 F at the stack base. This stack handles about 149,000 lb/hr flue gas at rated load.

Both original stacks, of welded and flanged construction, were made of copper-bearing steel. Larger stack was approximately 7 years old when replaced and the smaller stack was 15 years old. In the case of the larger stack, a maintenance painter discovered the area above the lower flange of the top section was badly corroded. It had, in fact, broken through for about half of its circumference. Remaining half was about 1/16-inch thick. Original thickness had been ¼ inch.

This was considered critical enough for us to immediately remove the top one-third of the stack for safety reasons. Investigation at this time indicated metal thickness of ⅛ inch at the bottom of the center section and less than 3/16 inch at the base. Smaller

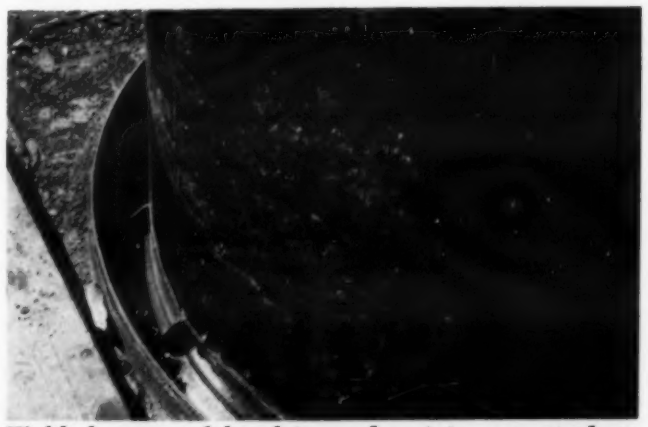
A little more than usual care is needed in handling glass-coated stack, particularly with bottom section.

stack was similarly corroded but not to the extent that any portion required immediate removal. We attribute the corrosion to acid attack caused by elements in the flue gas condensing out at low stack temperatures.

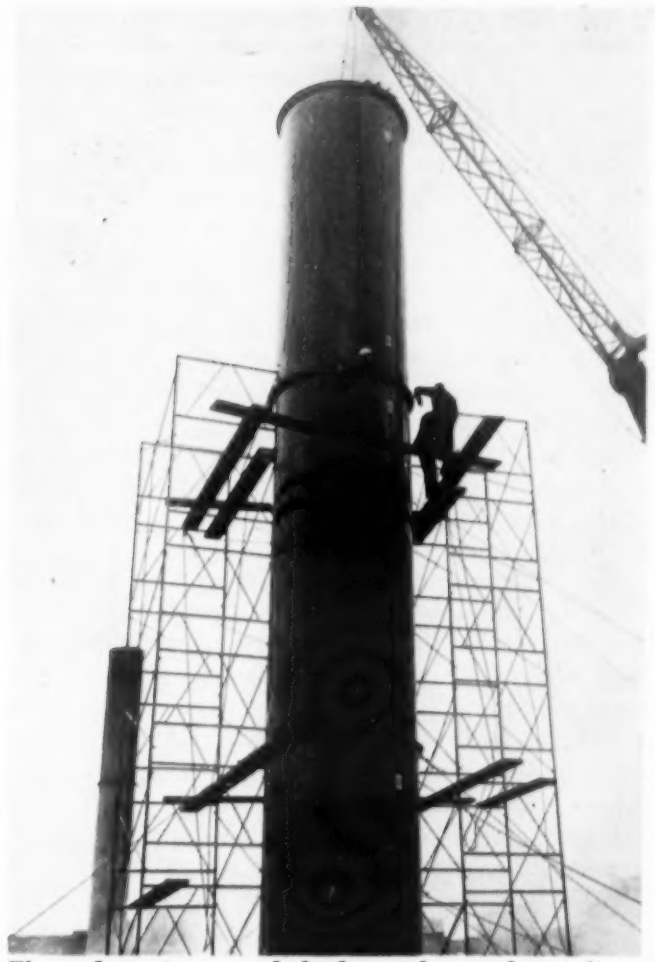
We considered replacing the stack in copper-bearing steel. But the 7-year life we had experienced did not appeal to us. Lining with masonry was investigated but deemed impractical because of weight considerations. Stainless-clad steel was too costly. We also considered wrought iron, which possibly would have been chosen if we had not come across an article on glass-coated smokestacks in a technical magazine. We hope that these new Perma-Glas stacks made by A. O. Smith Corp. will last for 25 to 30 years or more.

Perhaps a little more care is required in handling and erecting glass-coated stacks. Certainly the cost is higher, but we think that it is justified. Care must be taken in joining the new stack to the breeching. We used a welded-on metal band. This area appears to be the most likely point for future maintenance problems.

We feel the installation is justified primarily on



Welded-on metal band is used to join new stack to old breeching. Here is where corrosion might start.



Flanged sections are bolted together and guy lines attached. Scaffolding goes up as sections are added.

an economic basis. If a conventional stack costs $6000 erected and lasts 10 years, it means a total investment of $18,000 to get a 25 to 30 year life. Assuming a glass-coated stack costs $9000 erected with a 25 to 30 year life, the savings are obvious. Extra benefits will be gained from using glass-coated stacks, because they will require no exterior painting to maintain appearance.

We plan to replace our third metal stack with a glass-coated stack in the near future. If we had to replace the stacks again, we feel that we would proceed in the same manner as before. We would prefer, however, to replace all three stacks at once instead of first two and then a third. ♦ ♦

Perma-Glas stacks are manufactured by A. O. Smith Corp., Dept IP, Milwaukee, Wis. For more information, circle 585 on READ-N-CIRCLE card on page 47 or 48.

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How Hooker cut blowdown

. . . starts on page 18

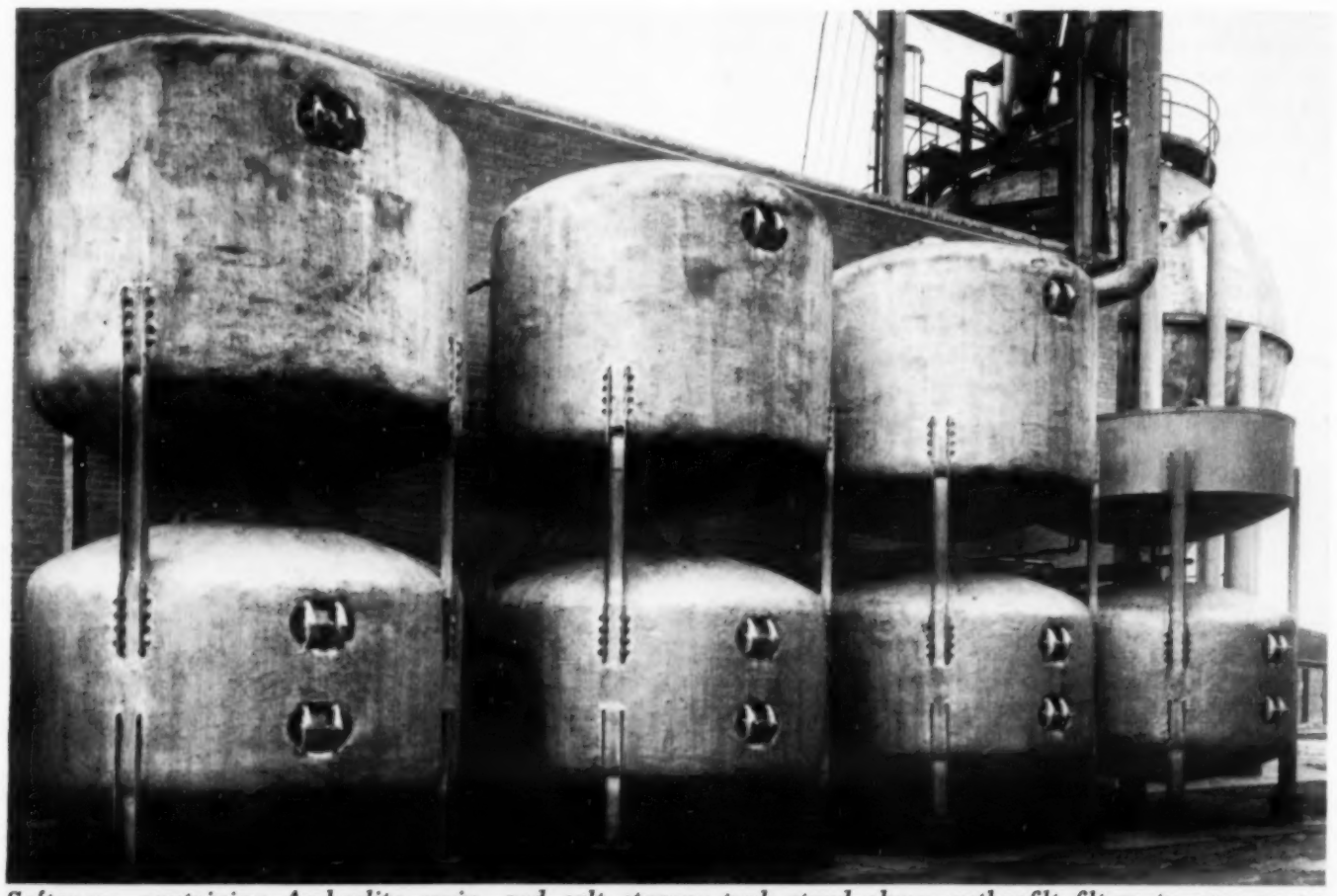
culates effluent through three ion exchange softeners, each containing 196 cu ft of Amberlite IR-120, a high-capacity cation exchange resin manufactured by the Rohm & Haas Company. This second softening step removes virtually all remaining hardness. Amberlite IR-120 resin resists high temperature and alkaline effluent from the sedimentation tank. Final conditioning step is a spray-tray, two-stage deaerating heater where softened water is scrubbed and boiled by contact with steam and then cascaded over a series of trays. When leaving this equipment, deaerated water has an oxygen content of less than 0.005 ml/l.

All system elements except required controls and instrumentation are located outdoors. Space was saved by double-tiering the three softeners and salt tank above the filter tanks. System is automatic except for initiating softener regeneration and filter backwashing. Influent to each softener is totalized continuously. When any unit has softened its limit, a horn warns operator to regenerate.

One byproduct of expanding industrial activity is a greatly increased demand for steam. New boiler capacity must be installed to meet the demand. This raises two questions about the water conditioning system that provides boiler feedwater. First, does it have enough capacity to furnish additional water without reducing water quality? Second, if quality remains unimpaired, is it good enough, given a reasonable amount of supplementary internal boiler treatment, for the newer boiler designs? Modern boiler trend is toward increased steaming rates and higher operating pressures. As water consumption, operating temperature, and pressure increase, it will follow that problems of scale deposit, corrosion, and erosion are magnified sharply. Boilers demand much lower concentrations of hardness, silica, dissolved solids, and gases than were once acceptable. So modernizing a boiler plant must frequently go hand-in-hand with updating the water conditioning system. Hooker's decision to act now is already paying off in reduced chemical bills, reduced fuel bills, and reduced maintenance bills. . . . with capacity to grow in the future assured. ♦ ♦

Amberlite resins are manufactured by Rohm & Haas Co., Dept. IP, 712 Locust St., Philadelphia 5, Pa. For more information, circle 590 on READ-N-CIRCLE Card on page 47 or 48.

Water conditioning systems are manufactured by Graver Water Conditioning Co., Dept. IP, 216 W. 14th St., New York, N.Y. For more information, circle 591, READ-N-CIRCLE Card, pages 47 or 48.



Softeners, containing Amberlite resin, and salt storage tank stand above anthrafilt filters to save space.

. . . starts on page 24

Visitors show avid interest in this graphic representation of an atomic electric power plant installation.

times the outlet pressure. For personnel safety, it further has been agreed that the test pressure will be lowered to 1500 psi during internal leak inspection.

"3) Since there is no drum, all safety valves will be placed at the superheater outlet. They will be set approximately 5% over the bypass valve setting and will close above the pressure necessary to operate the bypass valves. The bypass valve will be set to open about 5% over the turbine throttle pressure.

"4) Special material will be required in the finishing superheater which is not a code material. Stress allowances to be used for this material will be determined in a manner similar to that used by the Boiler Code, after accumulation of data suitable for the purpose, and approval by the proper State authority."

Suppressing coal dust

I. M. Fisher, Johnson-March Corp.

"A fundamental problem in many power plants is coal dust. This has been particularly aggravated by the shipment of coal with lower and lower moisture content. In some cases, this has been as low as ½ of 1% with a large percentage of fines present.

"There are several possible solutions to the coal-dust problem. Many have been tried. One method is to enclose the coal-handling system completely and exhaust the dust to a dust collector. The major objections to this are that satisfactory results are almost impossible to accomplish, the cost is prohibitive, and the hazards of fires or coal-dust explosion are increased. Another objection is that there is no satisfactory way of enclosing a rotary car dumper or a track hopper discharge. Still another objection is that no dust control can be had with dry dust collection when putting coal in storage.

"A second means of cutting down on coal dust is to oil treat the coal at the mines. The objection here is not only cost (about 15¢/ton), but no benefit is obtained during the crushing and subsequent handling. Coating the coal particles with a thin film of moisture would solve the problem. But spraying water on coal is ineffective as the water rolls off the coal even when considerable amounts are applied. Some agent is required to make the moisture adhere to the coal particles and stay with them through the entire coal-handling operation.

"An effective and inexpensive method has been developed. This consists of treating the coal with a surface-acting agent added to the water. For this purpose, many agents have been tried, but most offered practical difficulties in use in the field. A considerable amount of research has gone into to securing a surface-active agent that would have all the desirable qualities for year-round use and be suitable for various water conditions. Finally, one was [developed]. . . .

"Coal dust in a power plant can be controlled effectively with a liquid system throughout the coal-handling operation. The possibility of fire and explosion is reduced to a minimum. Coal-dust cleanup time in the plant is cut down. The dust nuisance in the plant and the community is eliminated. Operating and maintenance men, including bulldozer and carry-all operators on the storage pile, work freely without the discomfort and hazards of dusty conditions. Through the prevention of stockpile-windage loss, savings are made in the plant, and good community relations are maintained."

Future cooling tower sizes

M. W. Larinoff, Mechanical Engineer,
Ebasco Services Inc.

"In planning its future cooling tower designs, the cooling tower industry can look forward to requests for larger size cooling towers for steam-electric power plant applications. Power plant cooling tower size is a function of turbine-generator size, quantity of heat discharged to the circulating water per kilowatt of installed capacity, and the design approach to design wet-bulb temperature.

"A continually growing demand of the nation's electric power requirements and an increased tendency of neighboring utilities to participate in power-pool arrangements make large-size turbine-generator installations economically attractive. . . .

"Although turbine-generator units have been growing in size, circulating water quantity requirements per kilowatt of installed turbine capacity have been decreasing with technological advances over the years. The continuous improvement of plant heat rate has meant less heat discharged to the circulating water system per unit of generated energy. Advances in high-temperature metallurgy, feedwater heating, reheating, and dual cycles have been responsible for decreasing circulating water quantity requirements. . . . A turbine-generator unit of 1920 design required about 1¼ gpm per kilowatt whereas today's supercritical-pressure plants need less than ½ gpm for the same circulating water temperature rise.

"Future cooling tower sizes as affected by design approach are not as well trended as either turbine-generator sizes or circulating-water-quantity requirements per kilowatt of installed turbine capacity. The design approach to design wet bulb temperature is determined from the study of initial cooling tower costs and fuel savings. For a given unit cooling tower cell cost, the greater the fuel cost the closer will be the justifiable approach and the larger the cooling tower—the less the fuel cost the smaller the justifiable tower size." ♦ ♦

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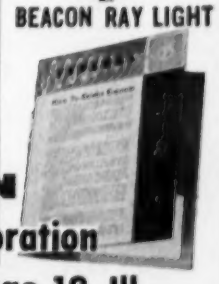

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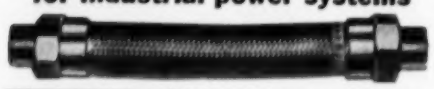

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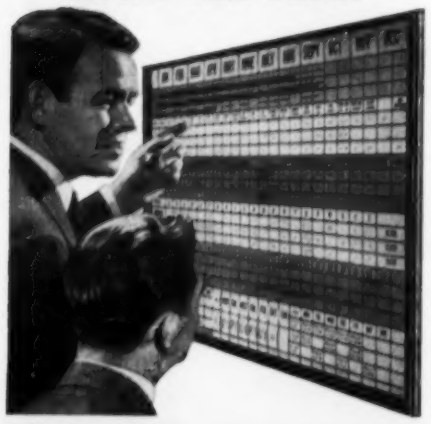

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If you are not already receiving INDUSTRY POWER personally, fill in the information called for below. If you qualify as an engineer who manages power services, you will be added to our circulation list without payment of any formal subscription price.

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_____ Government installation
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Equipment ratings:
Boilers: Number _____ Total Capacity: _____ lb/hr
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Total transformer capacity _____ kva
Total number electric motors _____ Total hp _____
Total number pumps _____ Total hp _____
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Products manufactured _____
Signed _____
Date _____

handy guide

. . . starts on page 46

LUBRICATION

Protects turbines longer
Read page 56 and circle number 108

THE TEXAS CO. Texaco Regal Oil R&O keeps turbine systems free from sludge, rust, foam. Assures normal bearing temperatures and instantaneous governor response.

MAINTENANCE ITEMS

Gaskets hold high pressures
Read page 49 and circle number 131

CHICAGO-WILCOX MFG. CO. Internal pressures that blow ordinary gaskets make Wilcox gasket tighter in the joint. Elastic filling is the secret.

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Read page 46 and circle number 112

GRAPHIC SYSTEMS. Boardmaster Visual Control gives graphic picture of your operations. Saves time and money, prevents errors. Write for booklet.

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Read page 50 and circle number 106

IDEAL INDUSTRIES, INC. Ideal maintenance tools restore commutators and slip rings without dismantling. Write for handbook.

Get the facts on portable power drives
Read page 43 and circle number 109

THE TOLEDO PIPE THREADING MACHINE CO. Investigate work-saving features of Toledo portable power drives. Write for free bulletins describing this line.

MATERIALS HANDLING (BULK)

Handling bulk materials?
Read page 38 and circle number 100

CANTON STOKER CORP. Flo-tubes will handle fine or lumpy materials on any incline. Guaranteed by specialists in the field.

Prevents bin flow bottlenecks
Read page 13 and circle number 128

GEROTOR MAY CORP. Pulsating neoprene panels inside bins prevent flow bottlenecks. PneuBin units fit inside your present bins.

PIPING, TUBING, AND HOSE

Seamless metal hose
Read page 46 and circle number 136

COBRA METAL HOSE. Use custom-constructed hose assemblies for your power system. All sizes available in bronze, stainless or carbon steel, Monel, Inconel, and low carbon nickel.

PUMPING EQUIPMENT

Barrel type boiler feed pumps
Read page 23 and circle number 102

DE LAVAL STEAM TURBINE COMPANY. Barrel type boiler feed pumps operate at pressures up to 5500 psi. Design advantages are described in Bulletin 1506.

TRAPS, STRAINERS, AND SEPARATORS

Banish steam losses
Read page 2 and circle number 121

ARMSTRONG MACHINE WORKS. Read case history telling how one chemical company saves $100,000 annually through steam conservation program. Write for details.

(more handy guide on page 50)

The Greater the Pressure . . . the Tighter It Holds!

There's still nothing simpler or more efficient in power line service than this Wilcox Self-Sealing Gasket which has served industry so well over the years. The U-shaped metal outer cover is packed with a resilient filling (usually rubber or asbestos). Pressure exerted on this elastic filling forces it into the cover, putting force against the adjacent flange surfaces. Thus, internal pressure that tends to blow ordinary gaskets makes the Wilcox Gasket tighter in the joint. Available with covers of copper, lead, tin, aluminum, monel, stainless steel, etc. in all sizes—standard or special.

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Circle 131 on READ-N-CIRCLE card for more data

Use this valuable aid to safety, health, operating economy

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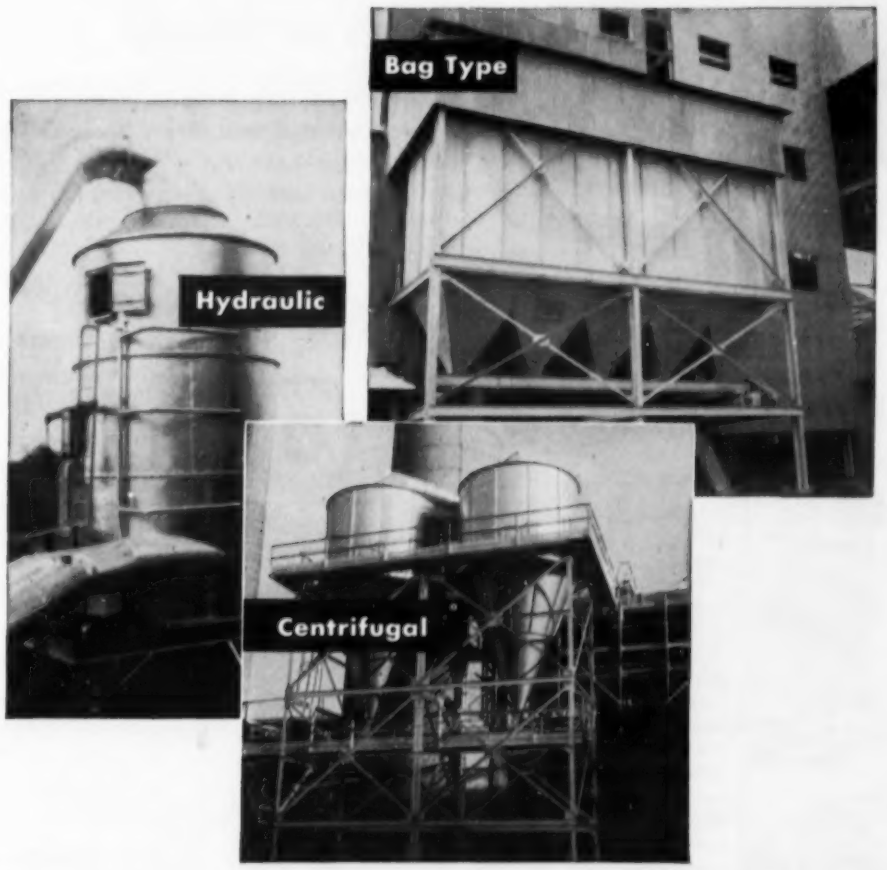
engineered Dust and Fume Collection



Any dust condition can increase operating and maintenance costs, slow down employee performance and increase industrial accidents. Norblo helps you to achieve outstanding efficiency in dust and fume collection—helps you to avoid those costly factors *economically*.

Norblo's experience in the removal of injurious or "nuisance" industrial air contaminants as well as *salvaging* valuable materials has been extensive in most industries. Complete systems are engineered to specific situations, incorporating one or more of the three collection systems represented above, according to your need. Get the facts on Norblo *guaranteed* performance. Write us about your problem.

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Engineered Dust Collection Systems for All Industries
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handy guide

. . . starts on page 46

Need pipe strainers?
Read page 41 and circle number 138

ARMSTRONG MACHINE WORKS. Armstrong Y-type strainers have corrosion-resistant stainless steel screens. Gaskets cannot blow out.

VALVES AND REGULATORS

Longer lasting gate valves
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THE CHAPMAN VALVE MANUFACTURING CO. Chapman List 960 wedge faces are hardened to 800 Brinell by exclusive process. Prevents galling and seizing.

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Read page 42 and circle number 139

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Read page 38 and circle number 133

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JIC and standard tube end plug valves
Read page 40 and circle number 120

REPUBLIC MANUFACTURING CO. Write for details on brass and aluminum alloy 2-, 3- and 4-way plug valves and hydraulic relief valves up to 450 psi.

WATER SUPPLY AND TREATMENT

Control foam, boiler water carryover
Read page 36 and circle number 122

THE BIRD-ARCHER COMPANY. Concentrol gives low-cost control of foaming. Can control sludge, too.

Demineralizers built in all sizes
Read page 40 and circle number 116

HUNGERFORD & TERRY, INC. A complete line of water conditioning systems is available. Investigate these fully guaranteed, highest quality units by writing for details now.

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Industrial water treatment specialists
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For low-cost industrial water supply
Read page 27 and circle number 126

RANNEY METHOD WATER SUPPLIES, INC. Ranney collector, infiltration gallery, intake, and vertube can solve your industrial water supply problems. Write for details. ♦♦

Keeps motors running like new... The easy, fast way to restore commutators and slip rings — WITHOUT DISMANTLING! — Substitutes low-cost prevention and correction for high-cost repair and rebuilding — COSTS LITTLE, SAVES A LOT.

RESURFACERS
Refinish commutators and rings to like-new condition even when ridged, scored or burned.

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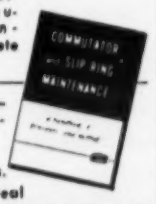
Stop sparking — help commutation — prolong brush life. For all sizes of commutators.

PRECISION GRINDERS
For more than surface smoothing—under machine's own power. Accurate to .001".

FLEXIBLE ABRASIVE
Cleans and burnishes commutators. Non-dusting. Complete size range.



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Circle 106 on READ-N-CIRCLE card

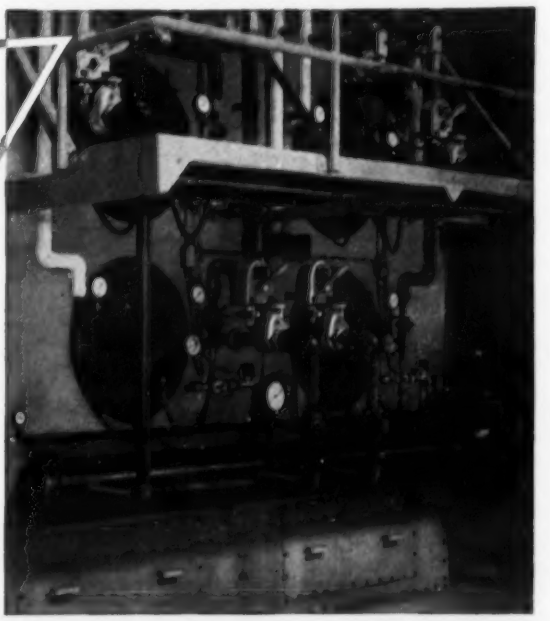
help wanted

You might be the man we are seeking to join our editorial staff. Read page 25 for details.

"You can spray it on more evenly than that, Foobly!"

ENCO BURNERS FOR OIL, GAS OR TAR

Steam Or Mechanical Atomizing 1 TO 1000 GALLONS PER HOUR



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EC 811

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spotlight on you . . . .

IN THE FIRST ELEVEN months of 1956, INDUSTRY POWER received 3,788 letters from readers requesting 52,336 reprints of articles. This is an increase of 75.1% over last year. And Reader Service processed 11,496 cards with 52,939 requests for information from manufacturers, again an increase of 53.1%.

This, to us, indicates real acceptance by you, of the job INDUSTRY POWER is doing. It indicates approval, we think, of our cover series featuring industrial leaders and their comments on the Power Services. It indicates that the cinemascopic pictures are effective and the magazine has wide readership.

Because of the heavy demand for copies of the Power Basics Series completed thus far we have run through all of our reprints of the Thermodynamics and the Electrical Basics. We now plan to offer the Series bound into more permanent booklets. They will measure 5½ by 8½ in. and will be stitched into a heavy, durable embossed cover suitable to keep on your desk or bookshelves. For easy identification we plan to have covers of different colors for each of the Series. Electrical Basics—the first book to be completed—will be bound into a yellow cover. A gray cover will identify Air Conditioning and Refrigeration Basics, which will be available shortly. To cover paper and printing costs we plan to charge 50¢ per copy for the booklets.

The many thousands of additional letters called for a wide assortment of reprints. A list of reprints available is shown at the back of each issue—these are available without charge. Many requests are received also for tearsheets of current articles. We usually reserve sets of tearsheets from each issue for just such requests. If you want a copy of an article you've just read, you needn't tear the magazine apart. Pass it along, and write, instead, for copies of whatever editorial you require.

This is a rather important point, incidentally. INDUSTRY POWER is circulated as widely as possible. Copies reach 22,000 manufacturing plants. This is far and away the most plant coverage of any magazine in our field. Yet, there are some 265,000 manufacturing plants in the United States; if you receive IP, it means that your plant has been selected among the top 10% of the plants in America and in that plant you are selected as an engineer responsible for the equipment necessary to sustain Power Services.

You can see therefore, it is important that IP get proper distribution throughout the plant. There are just not enough copies to send one to every engineer in the field. So, pass your copy along and send for tearsheets you want. We'll be glad to supply them.

statistics dept.: who writes to IP

It is interesting to analyze and compare your requests. Sometime ago, Spotlight On You presented an analysis of the cards received in January and February requesting information about equipment.

Since then, we've made similar analyses of letters requesting the Electrical Refresher and the Thermodynamics Series. Certain patterns appeared.

Administrative management displayed more interest in equipment than in reprints of technical articles. Plant management showed most interest in the Electrical Refresher, but engineering management was more interested in Thermodynamics although their equipment requests were high. Staff Engineers and Consulting Engineers responded equally on all three topics, Electrical Basics, Thermodynamics, and Equipment.

In the analyses by industry groups, the pattern is clearcut. Chemical & Process Industries, Machinery, Engineering Services and Utilities led in response in the order named and together accounted for 60% of the total in each survey.

Food industries—with steam a commonly used sterilizer—showed about the same response to thermodynamics and equipment, and less to electrical. Textile manufacturers showed most interest in equipment and least in thermodynamics.

Lumber and Wood products gave twice as much response to equipment as to Basics—a fact significant perhaps of a buying market.

Chemical & Process industries showed about equal interest in Electrical Basics and Thermodynamics with slightly less in equipment. Since equipment purchases have long run consistently high in these highly mechanized industries, it would follow that technical information is vital.

Stone, Clay and Glass were about equal in interest in Equipment and Electrical Basics, with slightly less in Thermodynamics. The Metal Industries greatest response was to Electrical Basics, with substantially equal interest in the other two categories. In the machinery trades, again Electrical Basics led, with equipment inquiries noticeably low.

Conversely, Transportation's greatest interest was equipment. Other Manufacturing & Mines, Utility requests ran more heavily to the technical data, as did Engineering Services.

The final group, Public Services and Institutions, showed least interest in Thermodynamics—most requests concerned equipment.

These are some of the observations we've drawn from totaling your requests. If you agree or disagree, why not write and tell us about it. We'll be glad to listen to your interpretation. ♦♦

names make news

. . . personalities from industry power

Instrument Society of America elects **Justus T. Vollbrecht** national president. He succeeds **Robert T. Sheen,** president of the Milton Roy Co. Vollbrecht is founder and president of Energy Control Corp. He previously was ISA treasurer.

Allis-Chalmers Manufacturing Co. appoints **L. T. Rosenberg** chief generator design engineer and **G. W. Staats** engineer-in-charge, generator design section.

AIME elects **Dr. Augustus B. Kinzel** president for a one-year term to begin February 1958. Dr. Kinzel is vice president in charge of research, Union Carbide and Carbon Corp. President-elect for 1957 term is **Grover J. Holt,** general manager of the Ore Mining Department, **The Cleveland-Cliffs Iron Co.**

Day

Rentschler

Bryant Manufacturing Co., division of Carrier Corp. names **William M. Day** director of engineering. Day formerly directed the engineering program for Perfection Industries, division of Hupp Corp.

Diesel Engine Manufacturers Association elects **Walter A. Rentschler** president. He is vice president and general manager of Hamilton Division, Baldwin-Lima-Hamilton Corp.

American Institute of Consulting Engineers presents its Award of Merit to **Ralph Budd,** former Chicago Transit Authority chairman. Citation reads in part "distinguished American, outstanding engineer, able administrator, inspiration to young engineers; pioneer in the development of his country through leadership in transcontinental rail and motor transportation."

Panellit, Inc. elects **Millard D. Shriver** vice president in charge of sales. Shriver is credited with establishing one of the earliest instrumentation control systems in the steel industry — a control system for Republic Steel Company in 1932. Shriver was formerly general sales manager for Panellit, Inc. ♦♦

what's so strange .... about our willingness to send you INDUSTRY POWER without demand of a token subscription fee? Nothing, really. You see, no publisher of industrial magazines breaks even on subscription revenue .... not after he's paid out the costs of getting that revenue. (Why, then, are there any "paid" magazines? Because the "paid" designation permits mailing at cheaper, second-class rates than is possible for "controlled-circulation" magazines, such as INDUSTRY POWER.)

We prefer to hand-pick the men who will receive INDUSTRY POWER on the basis of continuing research that tells us who are the important men that work in the field our editors and advertisers serve. By selective hand-picking, rather than by extracting a token fee from anyone who might be susceptible to a subscription pitch, we can be sure that we reach the men who matter most in managing the Power Services. Is that so strange?

The Editors

P.S. Many "paid" magazines have substantial "controlled" circulation .... up to 30 percent is permitted by postal regulation. And many publishers of "paid" magazines have "controlled" magazines in their stable, too. That IS strange.

available reprints

. . . from industry power

SORRY ....

Our stock of free Power Basics reprints is exhausted. Because of the unprecedented demand for copies of this popular series we are having our printer make each of the series —Thermodynamics, Electricity, and Air Conditioning and Refrigeration —into handy 5½- by 8½-inch booklets with a heavy, durable, embossed cover. They will be available this month at 50¢ each. Rates on quantity orders will be sent on request to Reader Service Department, INDUSTRY POWER, Shepard-Benning Building, St. Joseph, Michigan.

Power Basics Booklets

Our popular Power Basics Series will be available shortly at 50¢ per copy. Send in your order today.

- *Power Basics I: Thermodynamics*
- *Power Basics II: Electricity*
- *Power Basics III: Air Conditioning and Refrigeration*

Single copies of following reprints are available free. Quantity orders for individual reprints quoted on request. Address all correspondence, on company letterhead, please, to Reader Service Department, INDUSTRY POWER, Shepard-Benning Building, St. Joseph, Michigan.

Reprints not previously listed are identified by a star ★.

- *Big Savings for a Small Plant*
- *Bulk Handling as a Business*
- *Check That Steam Drum*
- *Cool Your Plant With Central Units*
- *Correction Table for Estimating Heating Value of Coal*
- *Dual Variable Pitch Pulleys*
- *Electric Drives Control Coal Feed to Dryers*
- *Electrically Heated Pipelines*
- *Engineered Insulation*
- *Estimating Heating Value of Coal*
- ★ *Fire Either Coal or Oil*
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- *What To Do About Anion Resin Deterioration*
- *What You Should Know About Fuel Oil Additives*
- *Why High-Temperature Water?*
- *Why Not Try Simplicity in Valve Controls?*

Special Report Reprints

Individual copies of Special Report Reprints will be sent free upon request. Additional copies are priced as follows: 2 to 24 copies are 25¢ each; 25 to 49 copies are 20¢ each; 50 to 99 copies are 15¢ each; more than 99 copies are 10¢ each. Special Report Reprints available are:

- *Combating Corrosion From Industrial Chemicals*
- *Contaminants in the Air*
- *Demineralization — A Means to Purer Water*
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the LOCATOR

. . . . a quick guide to advertisers' sales and service offices in your area

CITY BY CITY, here are the local offices of INDUSTRY POWER's advertisers waiting to serve you in your area. When you want quick information about any products or services you see described, look up the city nearest you under the listing for the advertiser you wish to reach. You will find local address and telephone number. (Home office listings are shown for all advertisers whose local offices are not listed.)

ARMSTRONG MACHINE WORKS .....**Page 2, 41**

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BUFFALO METER CO. .....**Page 33**

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CHARLESTON 24, W. VA.: Engineering Products Co., P. O. Box 1107, Phone 3-9411.
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NEWARK, N. J.: Energy Control Co., Inc., 868 Broad St., MArket 4-2585.
NEW YORK 38, N. Y.: Energy Control Co., Inc. 5 Beekman St., BArclay 7-0457.
NORTH HAVEN, CONN.: Energy Control Co., Inc. 31 State St., CEdar 9-2513.
PHILADELPHIA, PA.: Flow Engineering, Inc. P. O. Box 476, Flourtown, Chestnut Hill 8-1355.
PITTSBURGH 3, PA.: Harris Pump & Supply Co., Brady & Sidney Sts., S. S. HUbbard 1-4400.
RICHMOND 19, VA.: Berkness Control & Equip. Corp., 615 E. Franklin St., 3-5357.
SYRACUSE 7, N. Y.: Sherman Equipment Co., 146 Clyde Ave., Phone 75-5845.

CANTON STOKER CORP. .....**Page 38**

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CHAPMAN VALVE MFG. CO. .....**Page 6**

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CHESAPEAKE & OHIO RAILWAY ...**Page 35**

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COBRA METAL HOSE, DIV. OF DK MFG. CO. .....**Page 46**

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DEARBORN CHEMICAL CO. .....**Page 31**

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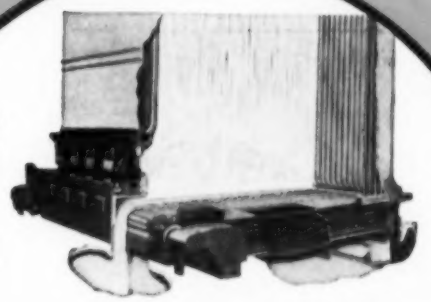

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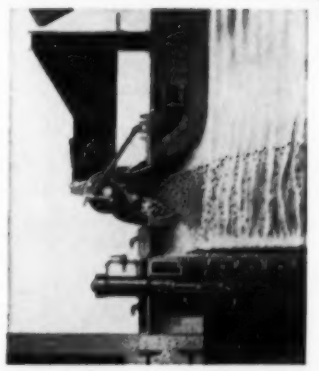

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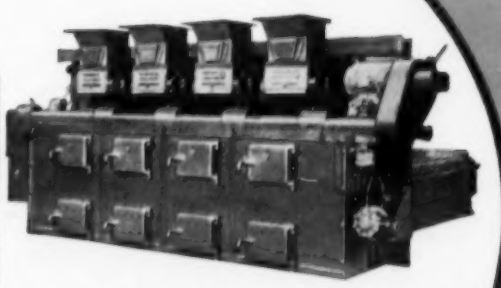

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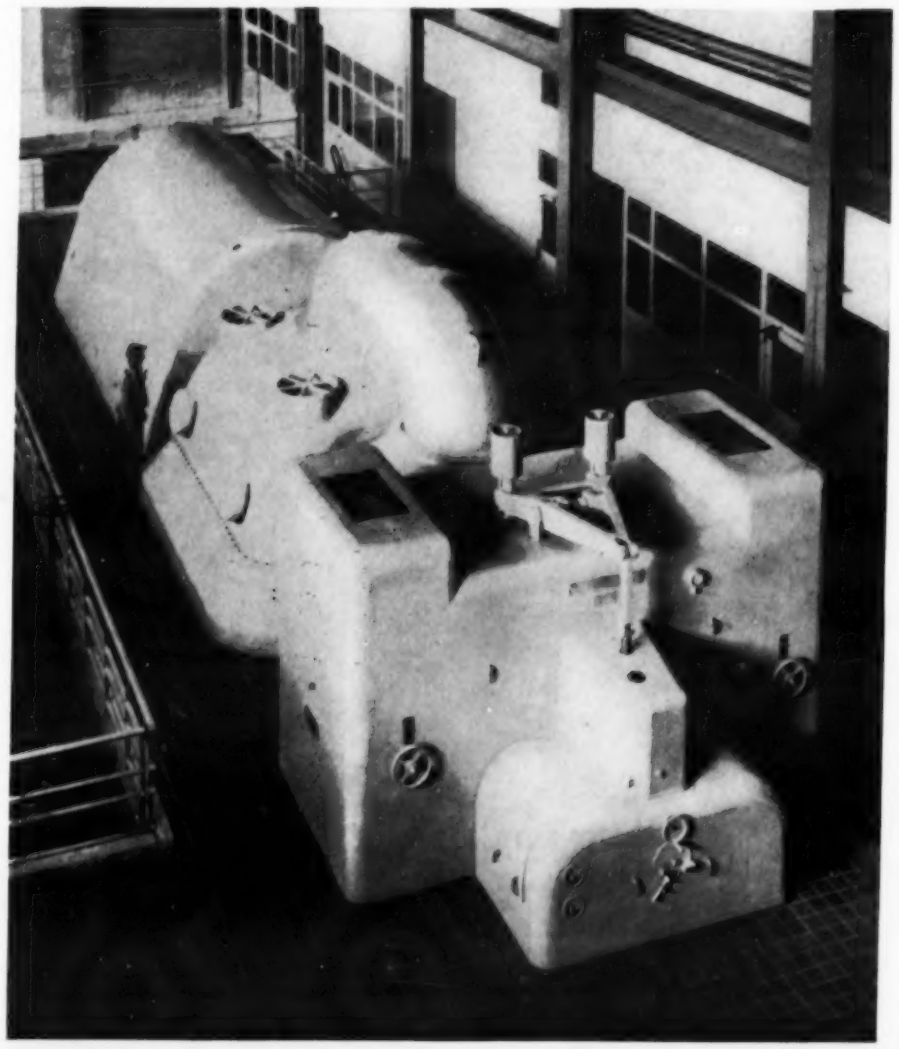

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